OCTOBER 26, 2023

AVEVA Adapters for MQTT and AVEVA Edge Data Store IIoT configuration workshop

Presented by: Ashish Jain, Evan Greavu

Goals and takeaways

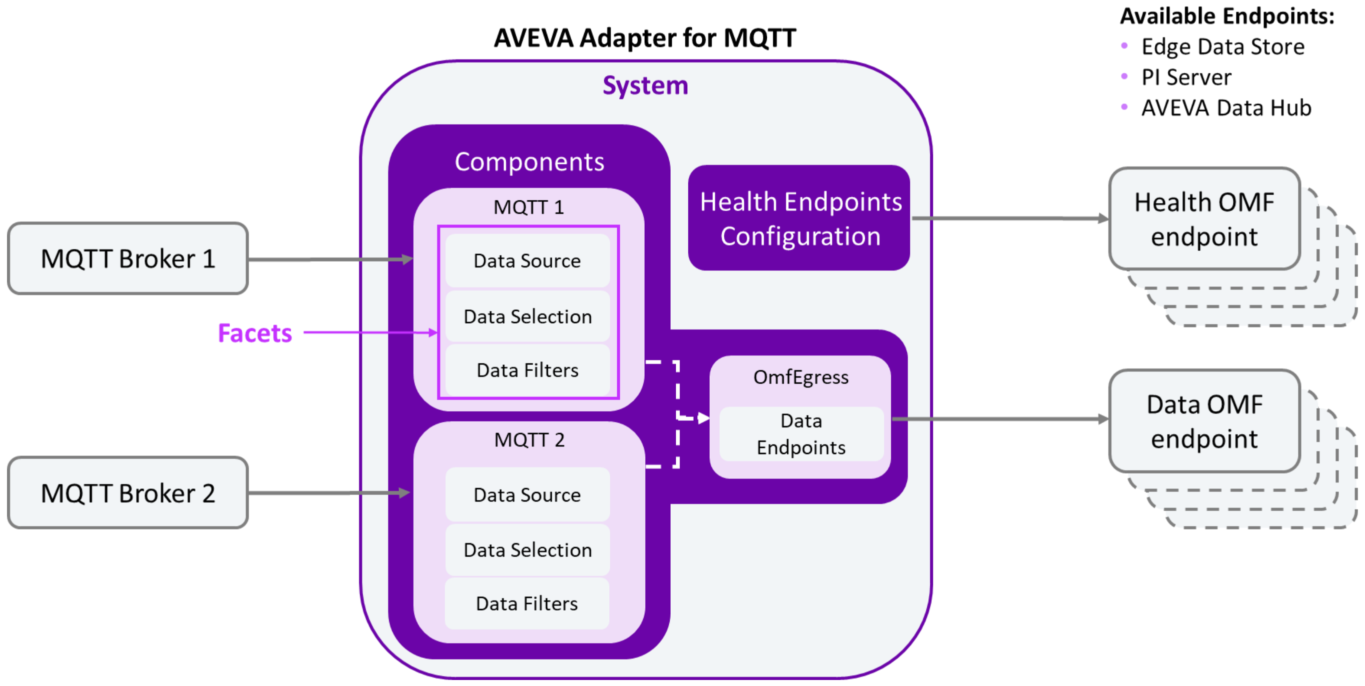
- Install and configure AVEVA Adapter for MQTT for data collection
- Install and configure AVEVA Edge Data Store for data ingress from the AVEVA Adapter
- Install both components on one Linux server
- Install EdgeCmd Utility and configure AVEVA Adapter to send data to AVEVA Edge Data Store
- Easy to setup and configure
- View the data that is set up for data collection

What is EdgeCmd?

- EdgeCmd is a command line application to configure and/or administer the AVEVA Edge Data Store and the suite of AVEVA Adapters
- EdgeCmd queries are translated to HTTP queries against REST API
- Separate install kit
- Supported on Linux or Windows OS
- Easy to use with facets
- Can also use cURL and/or Postman

What are facets?

- Sections of a configuration to make data collection unique for each adapter component
- Used with a list of operations (help, get, set, edit, add, remove, etc.)
- User-friendly names to help configure adapters easier
- Analogous to the different tabs we find in PI ICU



Different facets available to use

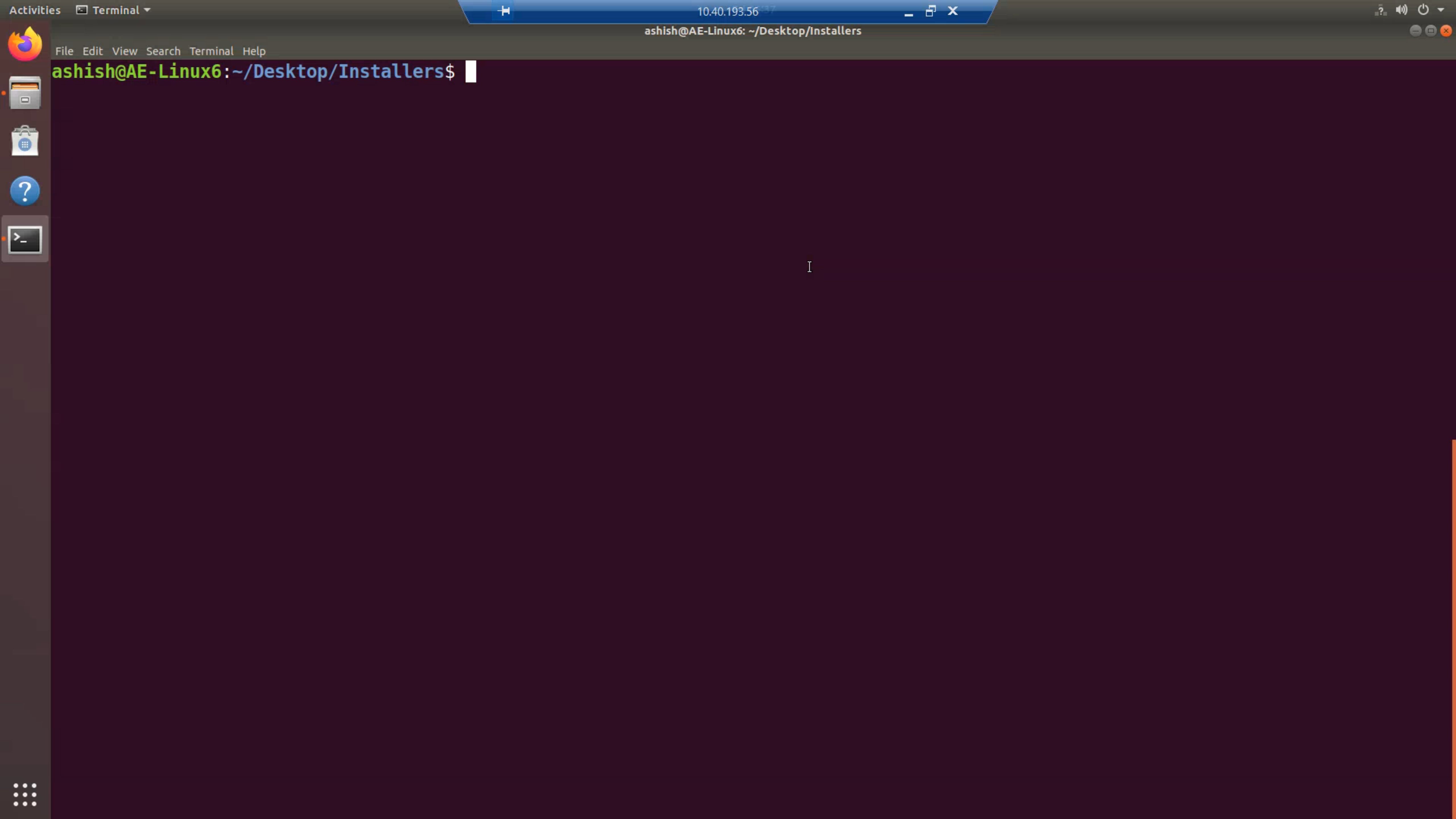
Configurable facets
Components
Logging
Buffering
HealthEndpoints
DataSource
RedundantServers
ClientFailover
DataEndpoints
DataFilters
DataSelection

Read-only facets
Version
General
Diagnostics
Application
FailoverState
ClientSettings

Pre-requisite

- The following components will be installed:
  - Edge Data Store on port: 5590
  - AVEVA Adapter for MQTT on port 5591
  - EdgeCmd utility
  - MQTT data source on port 1883
- What we will be doing:
  - Configure the adapter to connect to data source and discover for data
  - Configuration will be done using EdgeCmd
  - Use AVEVA Edge Data Store to view the results

Getting started: Installing the AVEVA software components

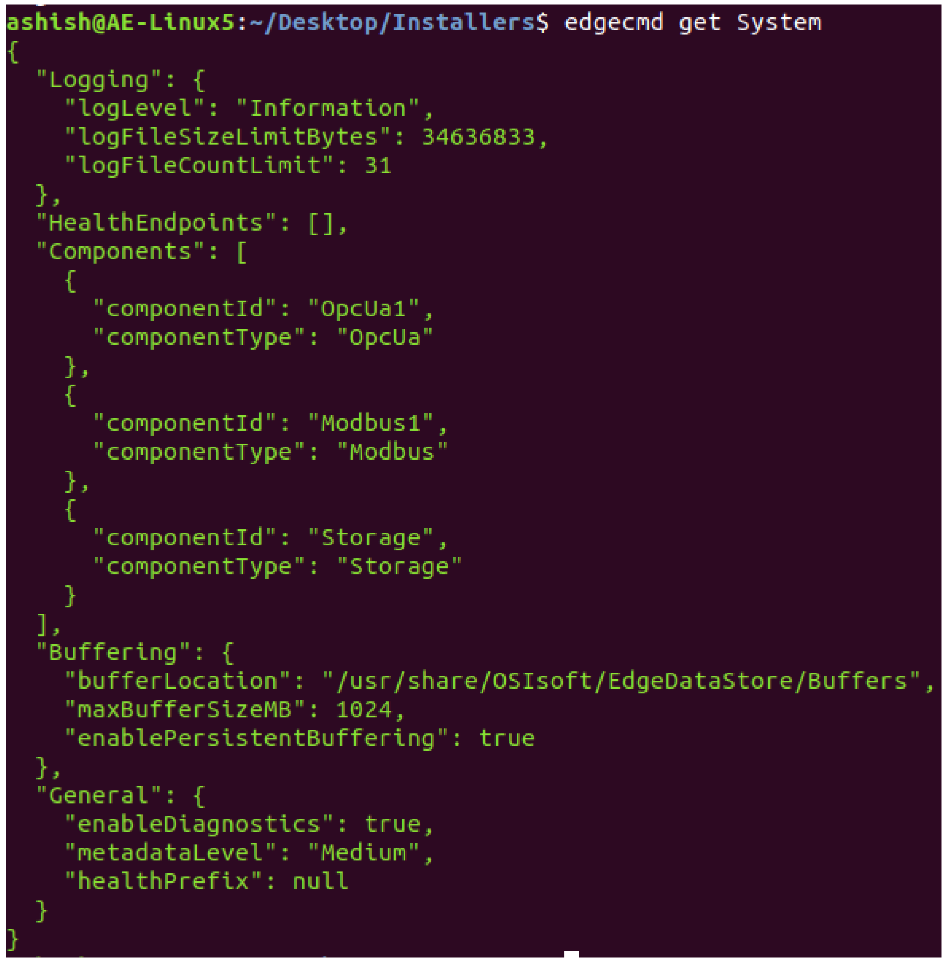


```
ashish@AE-Linux6:~/Desktop/Installers$ 
```

Getting started: Installing the AVEVA software components

Installing on Linux: sudo apt install <filename>

To verify: edgecmd get system



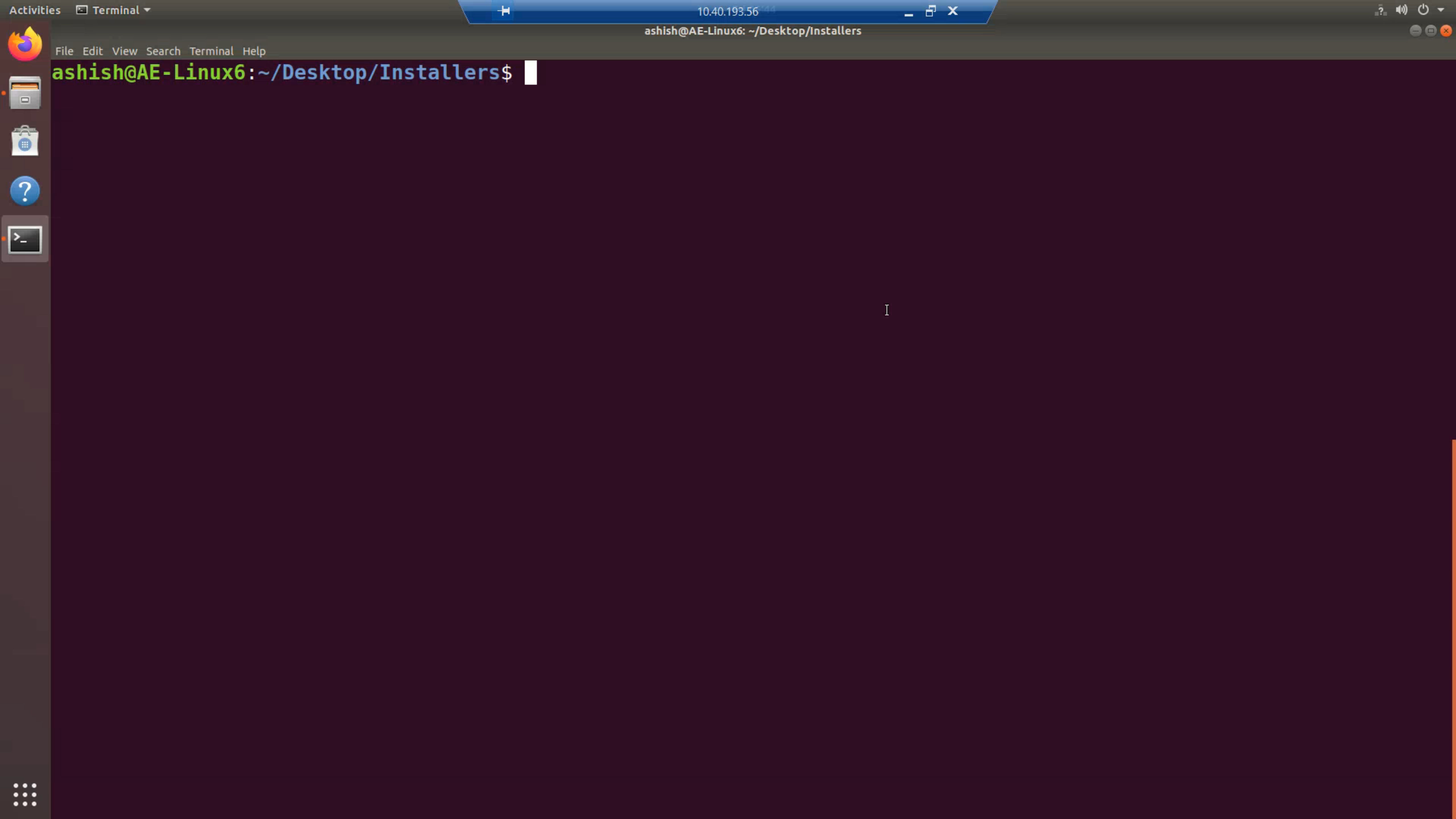
```
ashish@AE-Linux5:~/Desktop/Installers$ edgecmd get System
{
  "Logging": {
    "logLevel": "Information",
    "logFileSizeLimitBytes": 34636833,
    "logFileCountLimit": 31
  },
  "HealthEndpoints": [],
  "Components": [
    {
      "componentId": "OpcUa1",
      "componentType": "OpcUa"
    },
    {
      "componentId": "Modbus1",
      "componentType": "Modbus"
    },
    {
      "componentId": "Storage",
      "componentType": "Storage"
    }
  ],
  "Buffering": {
    "bufferLocation": "/usr/share/OSIsoft/EdgeDataStore/Buffers",
    "maxBufferSizeMB": 1024,
    "enablePersistentBuffering": true
  },
  "General": {
    "enableDiagnostics": true,
    "metadataLevel": "Medium",
    "healthPrefix": null
  }
}
```

Basics steps to configure an AVEVA Adapter

1. Create an AVEVA adapter component
2. Configure a data source
3. Configure egress to the data endpoint (AVEVA™PI System™, AVEVA Edge Data Store, and AVEVA™ Data Hub)
4. (optional) Configure health endpoints (AVEVA PI System, AVEVA Edge Data Store, and AVEVA Data Hub)
5. (optional) Configure data filtering
6. (optional) Discover data items
7. Configure data selection
8. Confirm data flow

Configuring the AVEVA Adapter

Create an adapter component



ashish@AE-Linux6: ~/Desktop/Installers

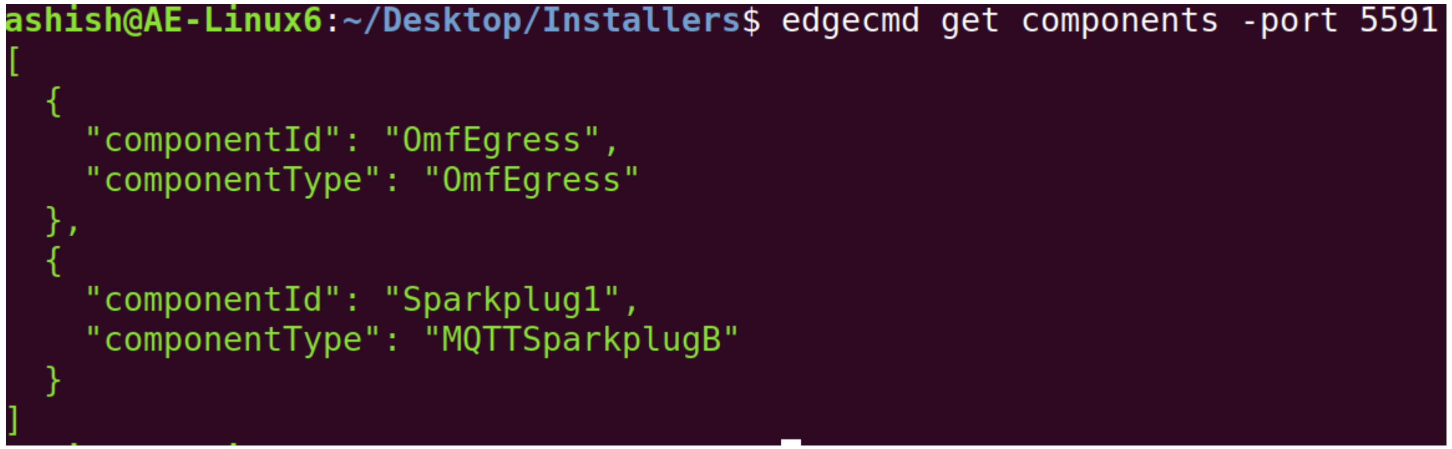
```
ashish@AE-Linux6:~/Desktop/Installers$ 
```

Configuring the AVEVA Adapter

Create an AVEVA Adapter component

Creating a component: edgecmd add components –type MQTTSparkplugB –id Sparkplug1 –port 5591

To verify: edgecmd get components –port 5591

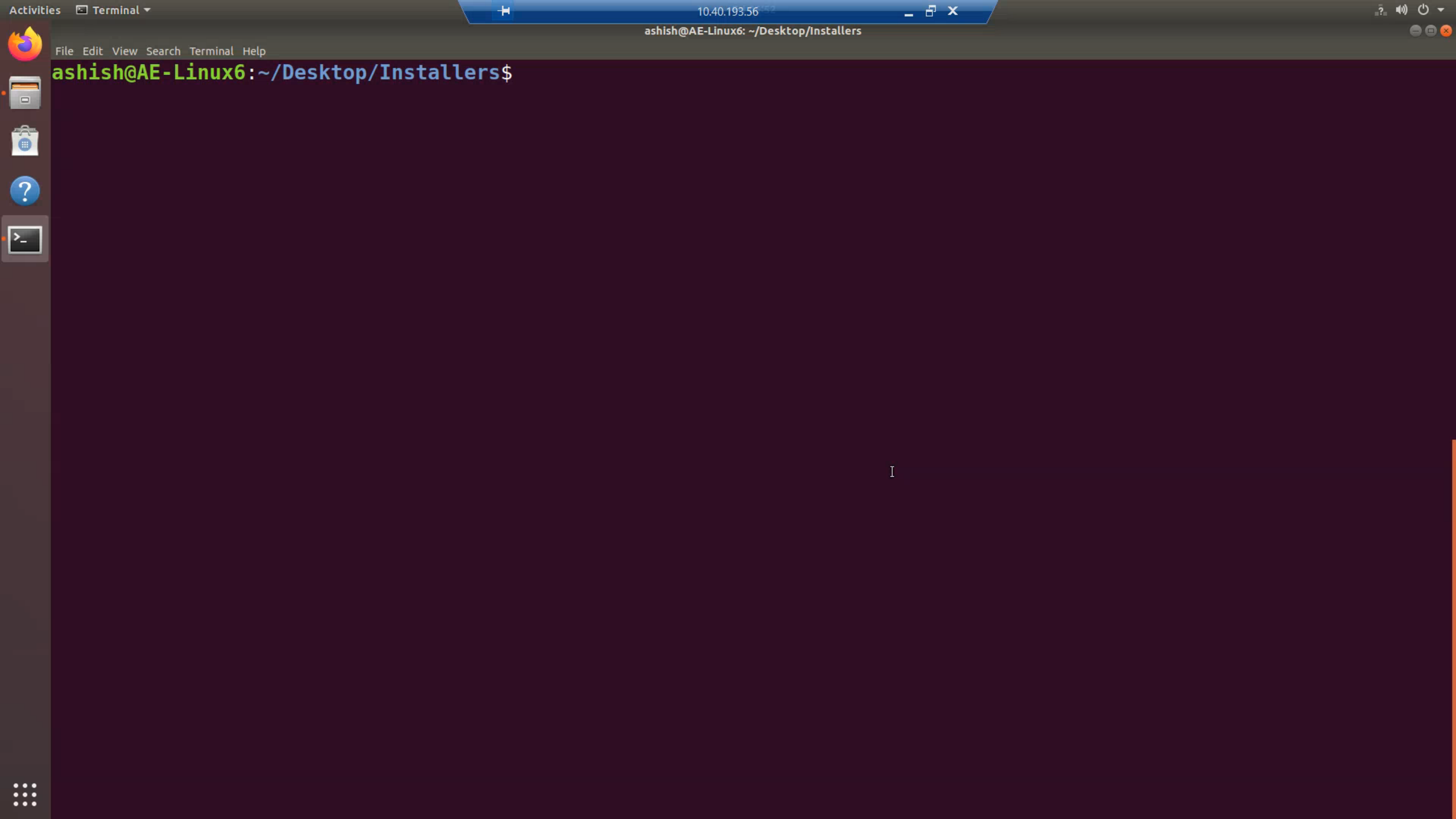


```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get components -port 5591
[
  {
    "componentId": "OmfEgress",
    "componentType": "OmfEgress"
  },
  {
    "componentId": "Sparkplug1",
    "componentType": "MQTTSparkplugB"
  }
]
```

Configuring the AVEVA Adapter

Configure a data source

AVEVA



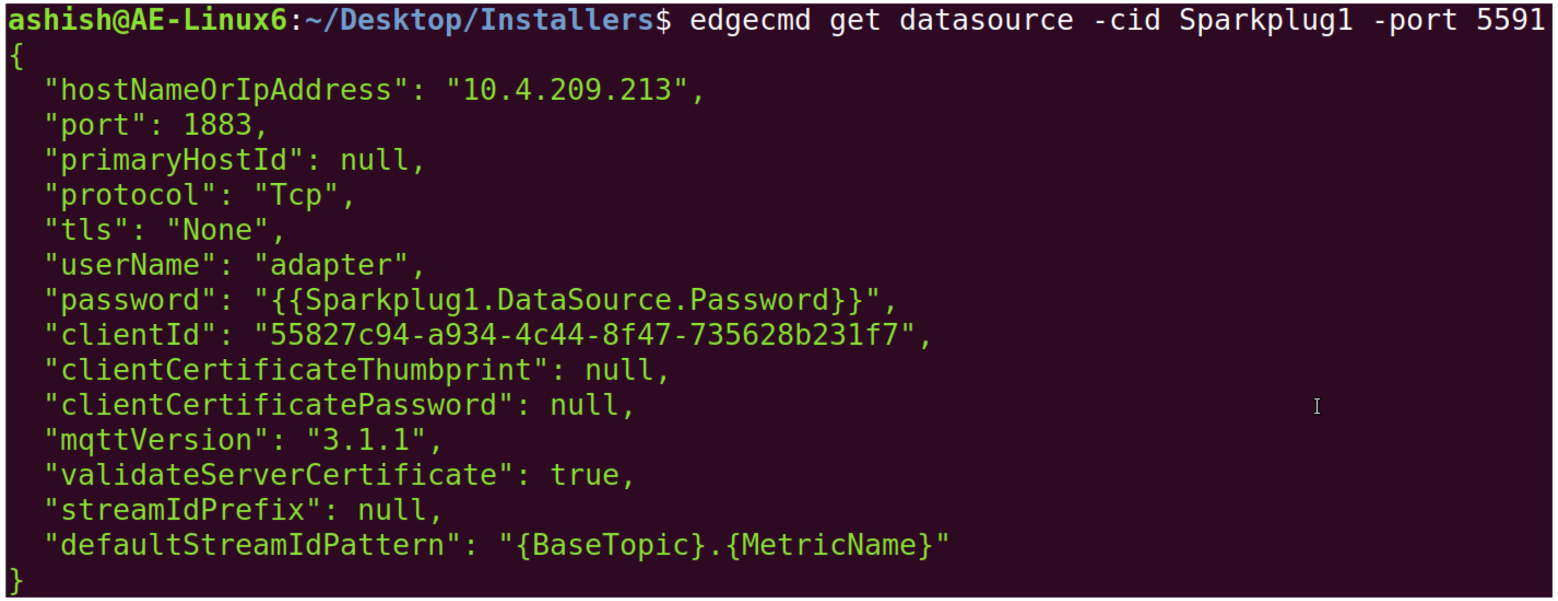
```
ashish@AE-Linux6:~/Desktop/Installers$
```

Configuring the AVEVA Adapter

Configure a data source

Configure datasource: edgecmd set datasource –cid Sparkplug1 –file DataSource.json –port 5591

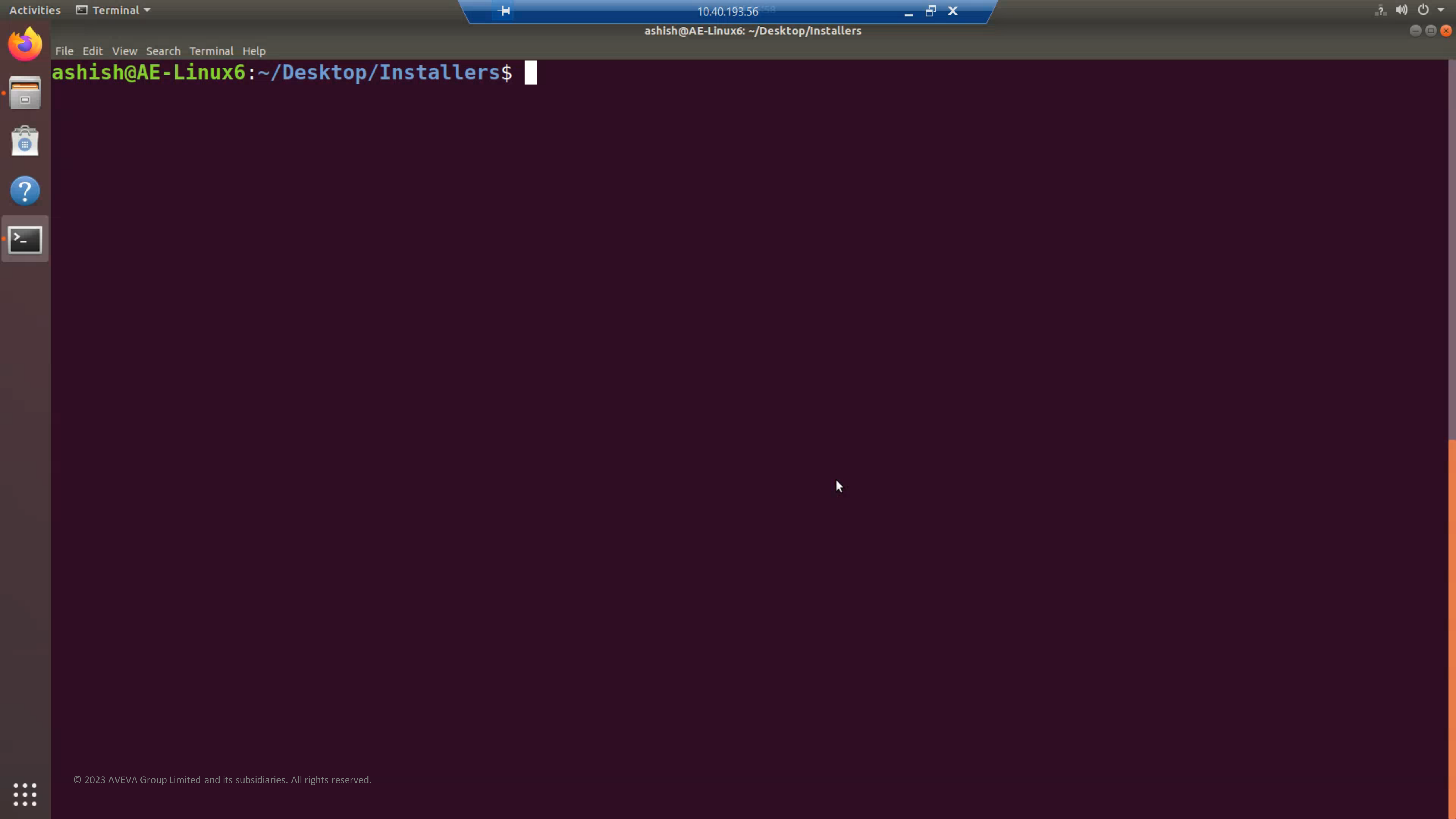
To verify: edgecmd get datasource –cid Sparkplug1 –port 5591



```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get datasource -cid Sparkplug1 -port 5591
{
  "hostNameOrIpAddress": "10.4.209.213",
  "port": 1883,
  "primaryHostId": null,
  "protocol": "Tcp",
  "tls": "None",
  "userName": "adapter",
  "password": "{{Sparkplug1.DataSource.Password}}",
  "clientId": "55827c94-a934-4c44-8f47-735628b231f7",
  "clientCertificateThumbprint": null,
  "clientCertificatePassword": null,
  "mqttVersion": "3.1.1",
  "validateServerCertificate": true,
  "streamIdPrefix": null,
  "defaultStreamIdPattern": "{BaseTopic}.{MetricName}"
}
```

Configuring the AVEVA Adapter

Configure egress to a data endpoint



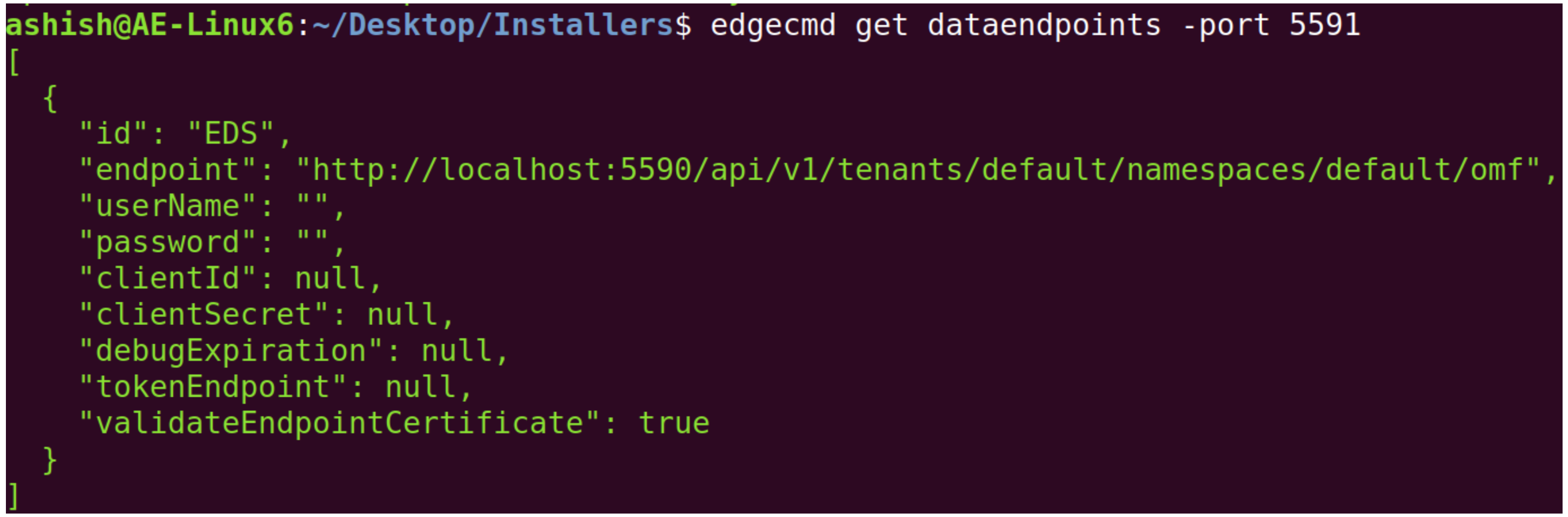
```
ashish@AE-Linux6:~/Desktop/Installers$ 
```

Configuring the AVEVA Adapter

Configure egress to data endpoint

Configure egress endpoint: edgecmd set dataEndpoints –file EgressEndpoint.json –port 5591

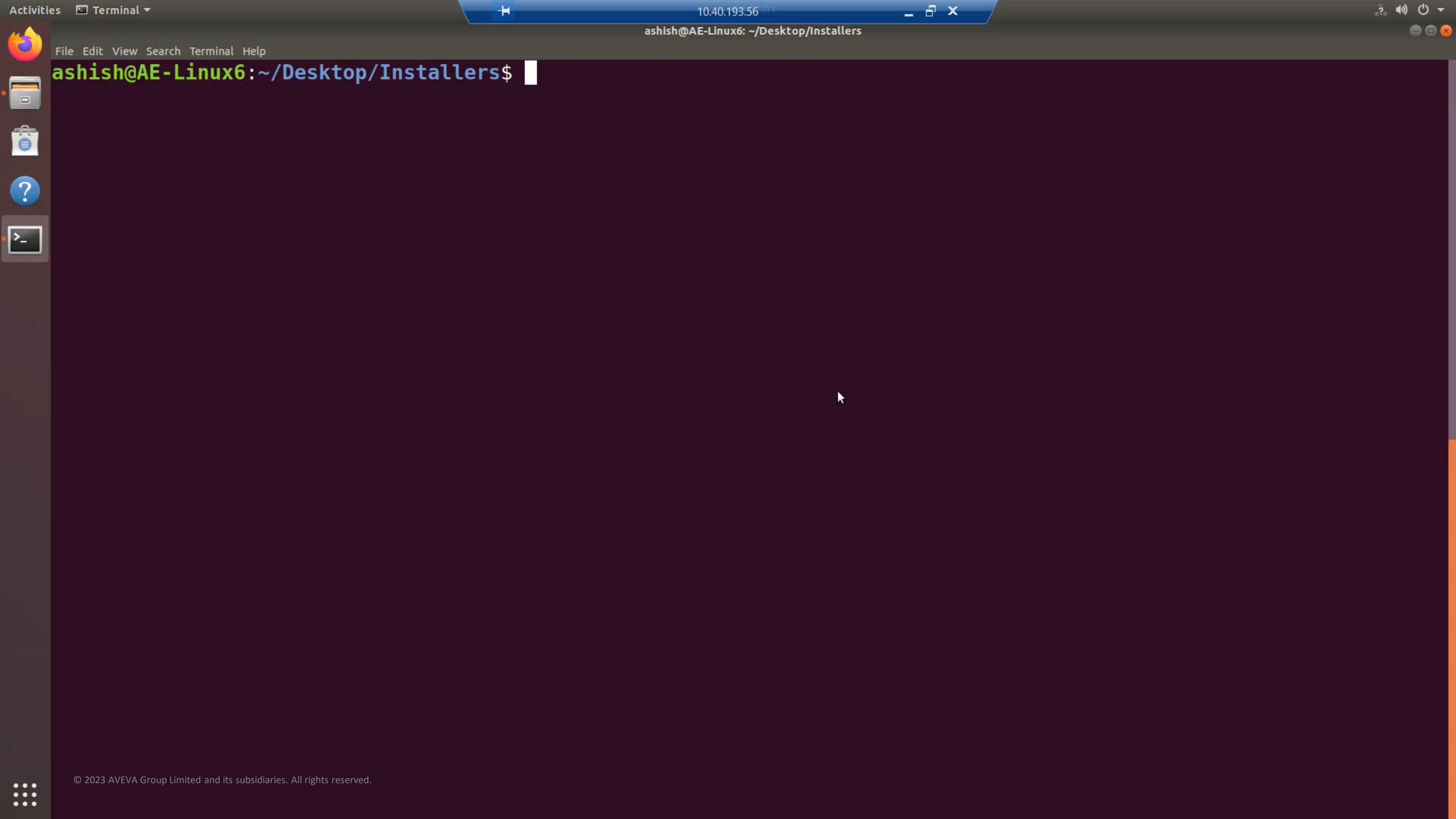
To verify: edgecmd get dataendpoints –port 5591



```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get dataendpoints -port 5591
[
  {
    "id": "EDS",
    "endpoint": "http://localhost:5590/api/v1/tenants/default/namespaces/default/omf",
    "userName": "",
    "password": "",
    "clientId": null,
    "clientSecret": null,
    "debugExpiration": null,
    "tokenEndpoint": null,
    "validateEndpointCertificate": true
  }
]
```

Configuring the AVEVA Adapter

(optional) Configure health endpoints



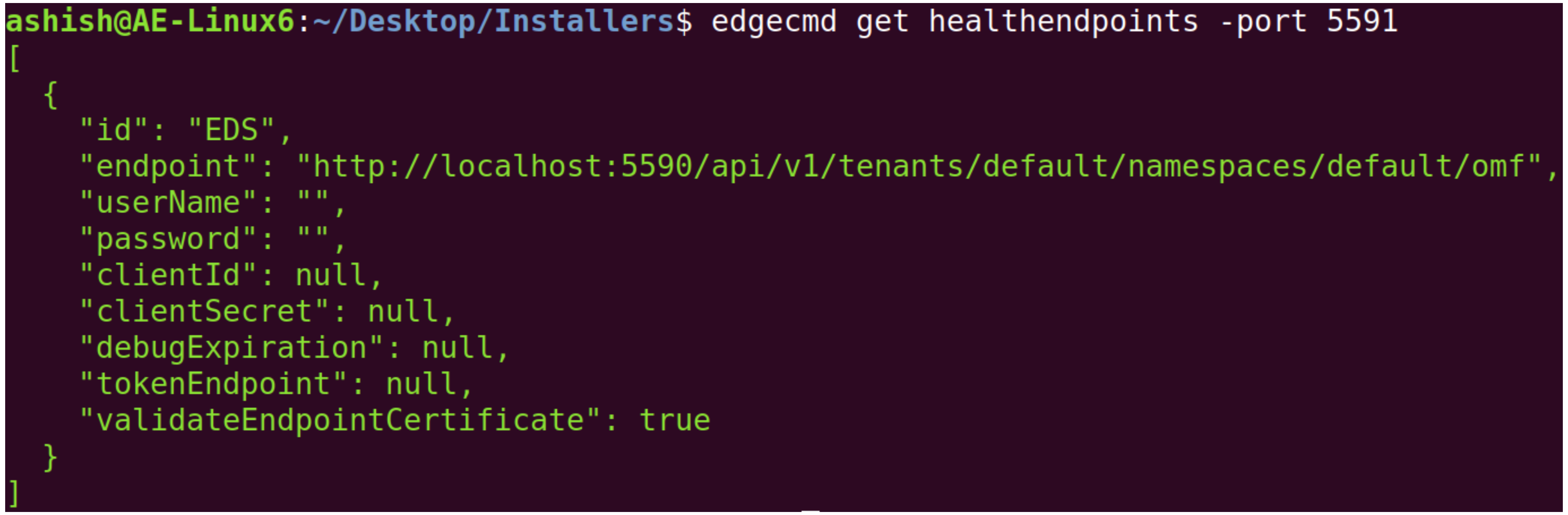
```
ashish@AE-Linux6:~/Desktop/Installers$
```

Configuring the AVEVA Adapter

(optional) Configure health endpoints

Configure health endpoint: edgecmd set healthendpoints –file EgressEndpoint.json –port 5591

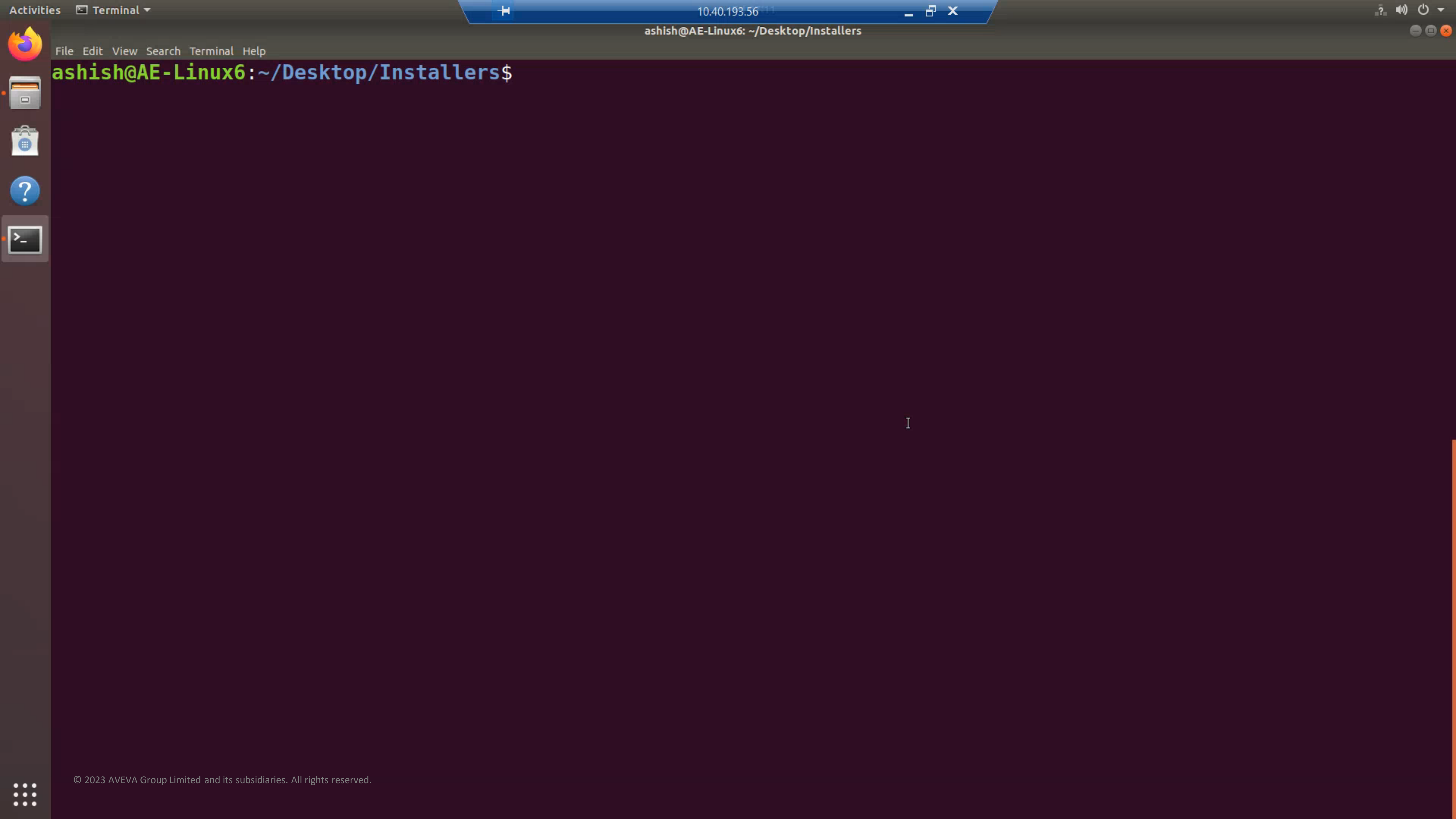
To verify: edgecmd get healthendpoints –port 5591



```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get healthendpoints -port 5591
[
  {
    "id": "EDS",
    "endpoint": "http://localhost:5590/api/v1/tenants/default/namespaces/default/omf",
    "userName": "",
    "password": "",
    "clientId": null,
    "clientSecret": null,
    "debugExpiration": null,
    "tokenEndpoint": null,
    "validateEndpointCertificate": true
  }
]
```

Configuring the AVEVA Adapter

(optional) Configure data filters



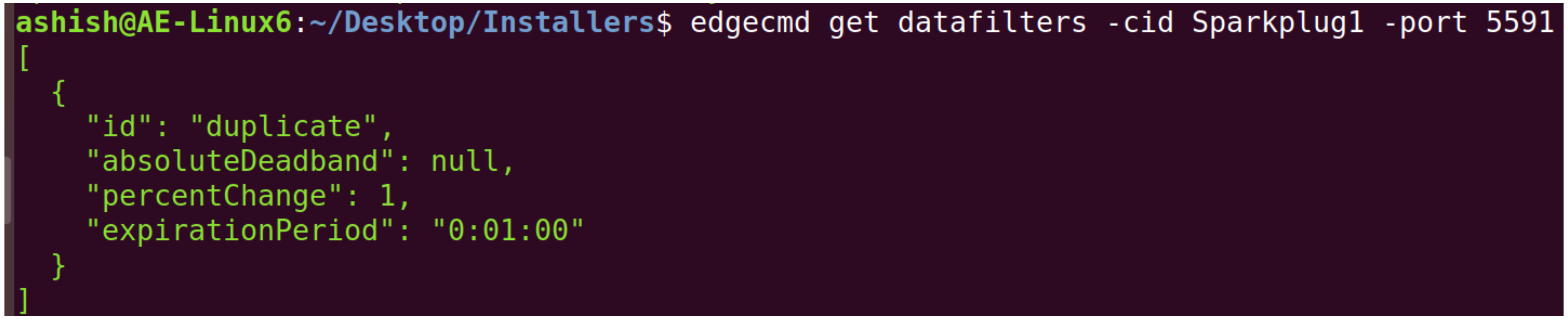
```
ashish@AE-Linux6:~/Desktop/Installers$
```

Configuring the AVEVA Adapter

(optional) Configure data filtering

Apply data filter: edgecmd set datafilters –cid Sparkplug1 –port 5591 –file DataFilters.json

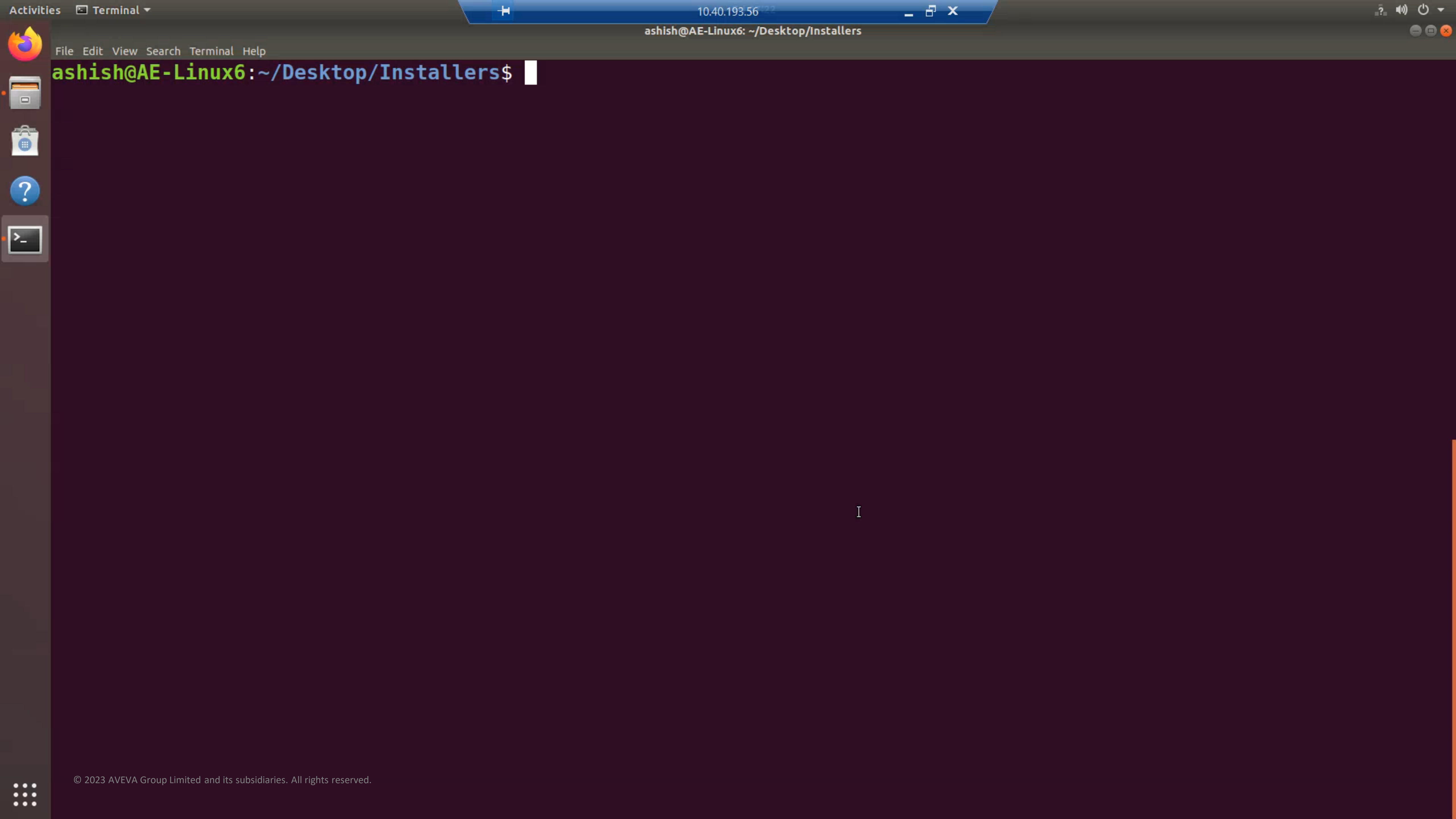
To verify: edgecmd get datafilters –cid Sparkplug1 –port 5591



```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get datafilters -cid Sparkplug1 -port 5591
[
  {
    "id": "duplicate",
    "absoluteDeadband": null,
    "percentChange": 1,
    "expirationPeriod": "0:01:00"
  }
]
```

Configuring the AVEVA Adapter

(optional) Discover data items


Activities
Terminal
10.40.193.56
ashish@AE-Linux6: ~/Desktop/Installers
File Edit View Search Terminal Help

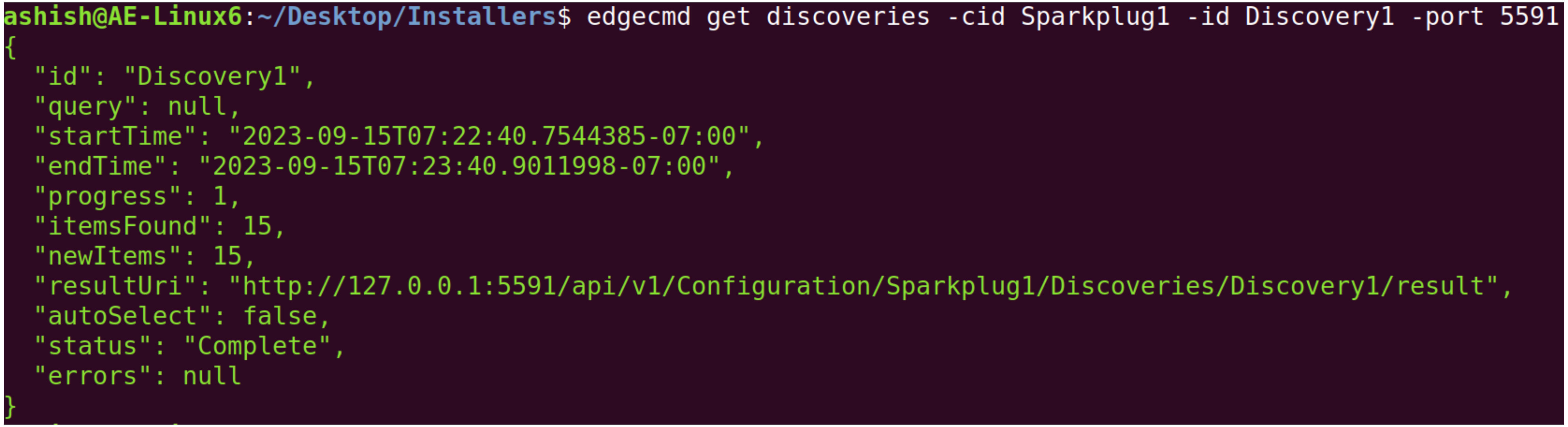
```
ashish@AE-Linux6:~/Desktop/Installers$
```

Configuring the AVEVA Adapter

(optional) Discover data items

To discover data items: edgecmd add discoveries –cid Sparkplug1 –id Discovery1 –port 5591

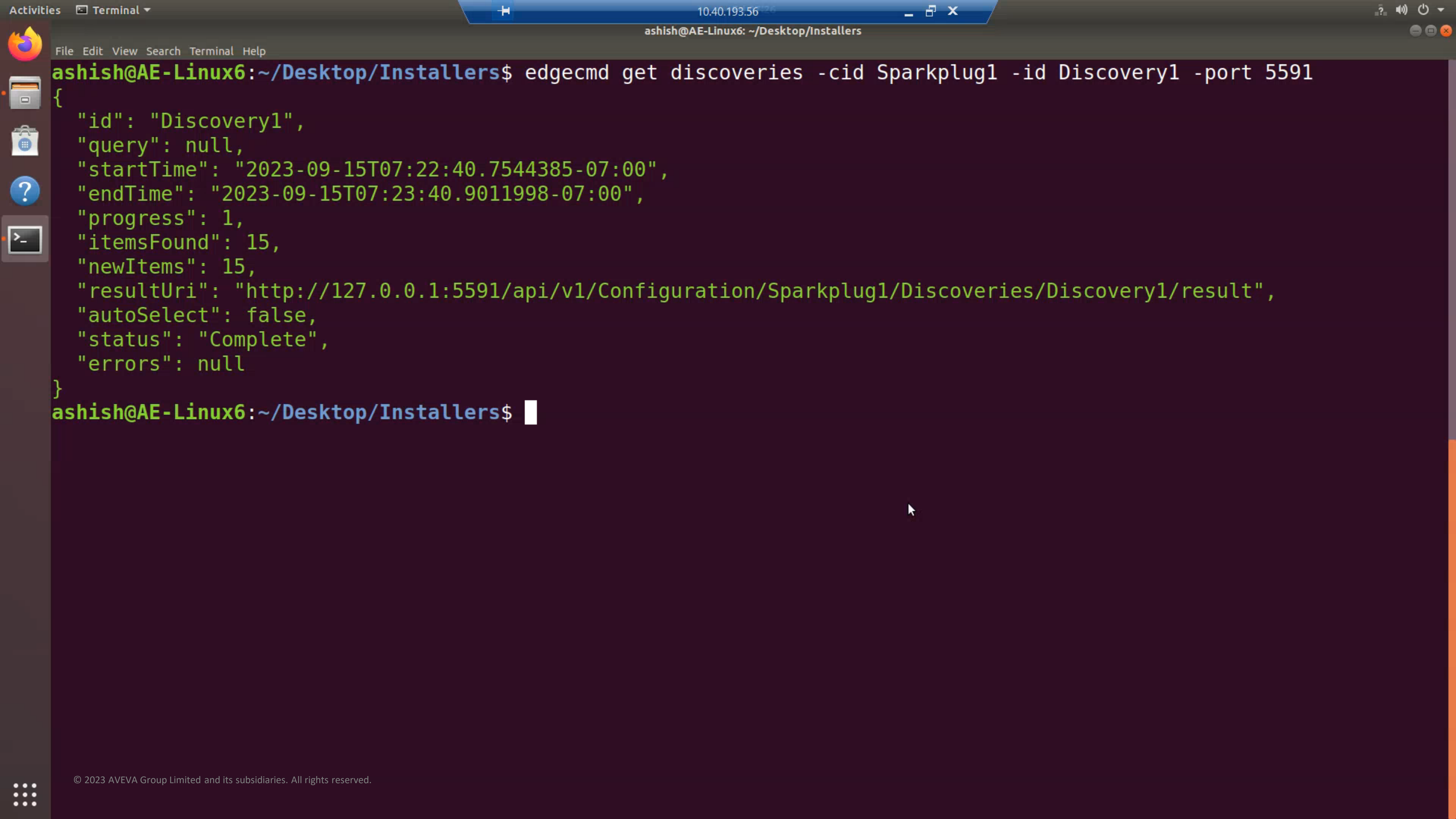
To verify: edgecmd get discoveries –cid Sparkplug1 –id Discovery1 –port 5591



```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get discoveries -cid Sparkplug1 -id Discovery1 -port 5591
{
  "id": "Discovery1",
  "query": null,
  "startTime": "2023-09-15T07:22:40.7544385-07:00",
  "endTime": "2023-09-15T07:23:40.9011998-07:00",
  "progress": 1,
  "itemsFound": 15,
  "newItems": 15,
  "resultUri": "http://127.0.0.1:5591/api/v1/Configuration/Sparkplug1/Discoveries/Discovery1/result",
  "autoSelect": false,
  "status": "Complete",
  "errors": null
}
```

Configuring the AVEVA Adapter

Configure data selection


Activities
Terminal
10.40.193.56
ashish@AE-Linux6: ~/Desktop/Installers
File Edit View Search Terminal Help

```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get discoveries -cid Sparkplug1 -id Discovery1 -port 5591
{
  "id": "Discovery1",
  "query": null,
  "startTime": "2023-09-15T07:22:40.7544385-07:00",
  "endTime": "2023-09-15T07:23:40.9011998-07:00",
  "progress": 1,
  "itemsFound": 15,
  "newItems": 15,
  "resultUri": "http://127.0.0.1:5591/api/v1/Configuration/Sparkplug1/Discoveries/Discovery1/result",
  "autoSelect": false,
  "status": "Complete",
  "errors": null
}
ashish@AE-Linux6:~/Desktop/Installers$
```

Configuring the AVEVA Adapter

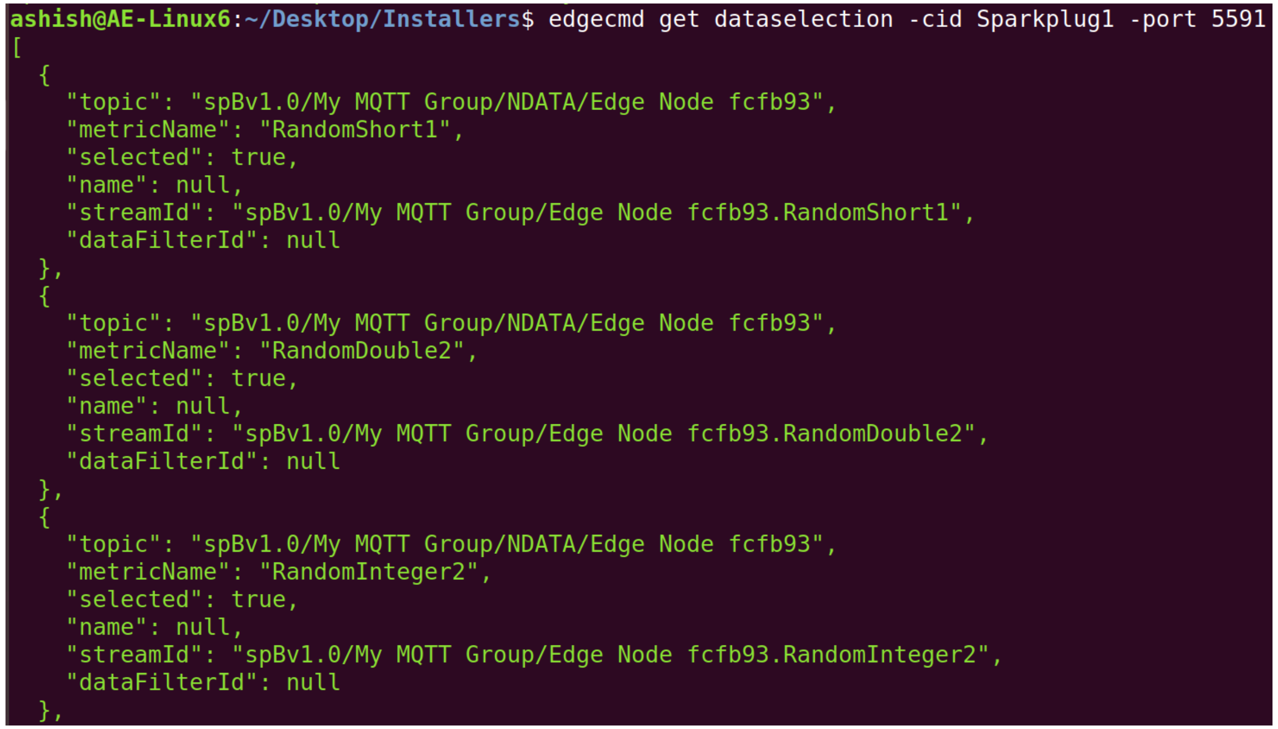
Configure data selection

Using discovery for data selection:
edgecmd add dataselection –cid Sparkplug1 –unselect –query discoveryid=**Discovery1** –port 5591

Outputting discovery results to file:
edgecmd get dataselection –cid Sparkplug1 –port 5591 > MQTTDataSelection.json

To apply data selection contents:
edgecmd set dataselection –cid Sparkplug1 –port 5591 –file MQTTDataSelection.json

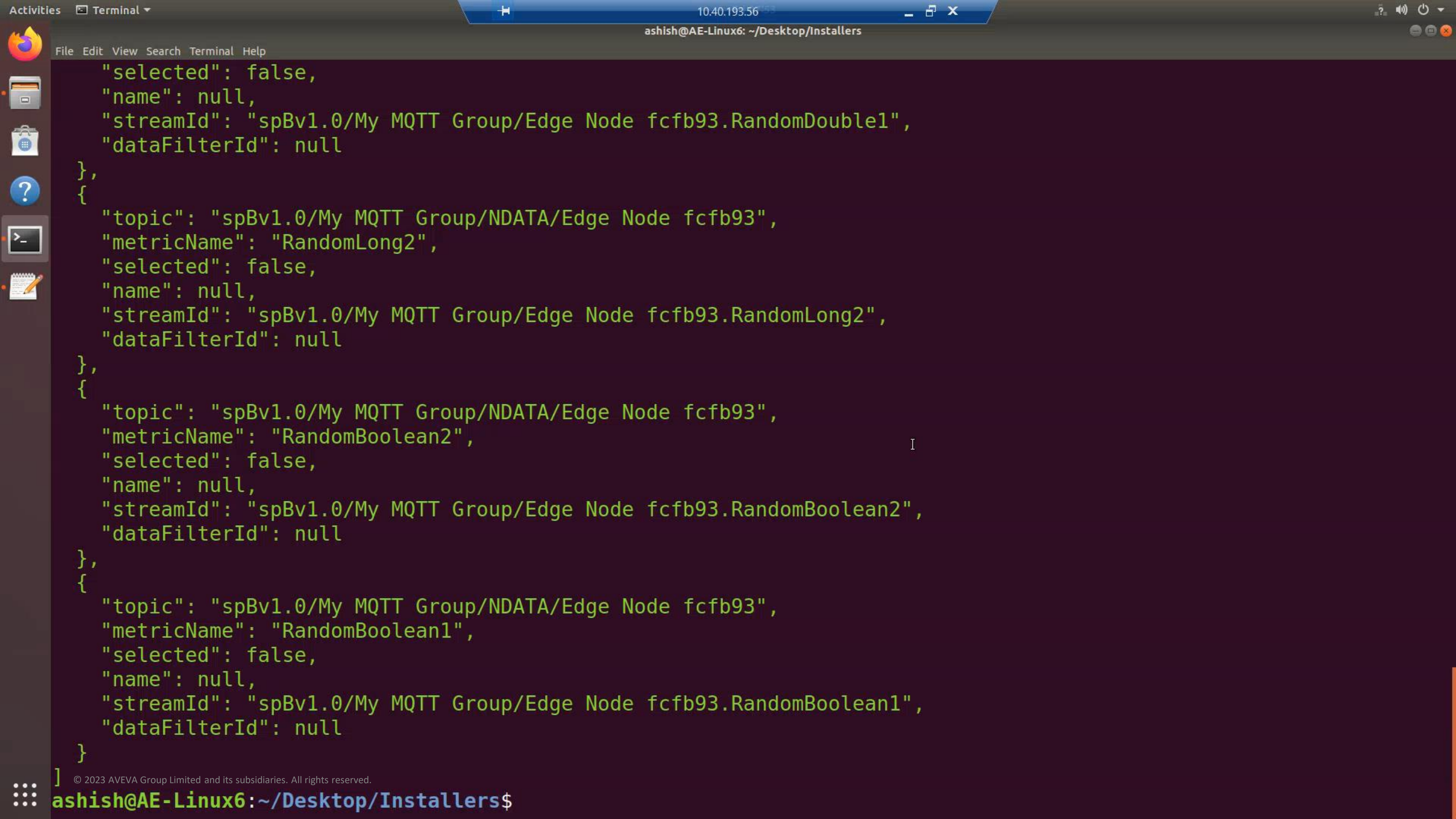
To verify:
edgecmd get dataselection –cid Sparkplug1 –port 5591



```
ashish@AE-Linux6:~/Desktop/Installers$ edgecmd get dataselection -cid Sparkplug1 -port 5591
[
  {
    "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
    "metricName": "RandomShort1",
    "selected": true,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomShort1",
    "dataFilterId": null
  },
  {
    "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
    "metricName": "RandomDouble2",
    "selected": true,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomDouble2",
    "dataFilterId": null
  },
  {
    "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
    "metricName": "RandomInteger2",
    "selected": true,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomInteger2",
    "dataFilterId": null
  },
```

Configuring the AVEVA Adapter

Confirm data flow



```
    "selected": false,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomDouble1",
    "dataFilterId": null
  },
  {
    "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
    "metricName": "RandomLong2",
    "selected": false,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomLong2",
    "dataFilterId": null
  },
  {
    "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
    "metricName": "RandomBoolean2",
    "selected": false,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomBoolean2",
    "dataFilterId": null
  },
  {
    "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
    "metricName": "RandomBoolean1",
    "selected": false,
    "name": null,
    "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomBoolean1",
    "dataFilterId": null
  }
]
ashish@AE-Linux6:~/Desktop/Installers$
```

Configuring the AVEVA Adapter

Confirm data flow

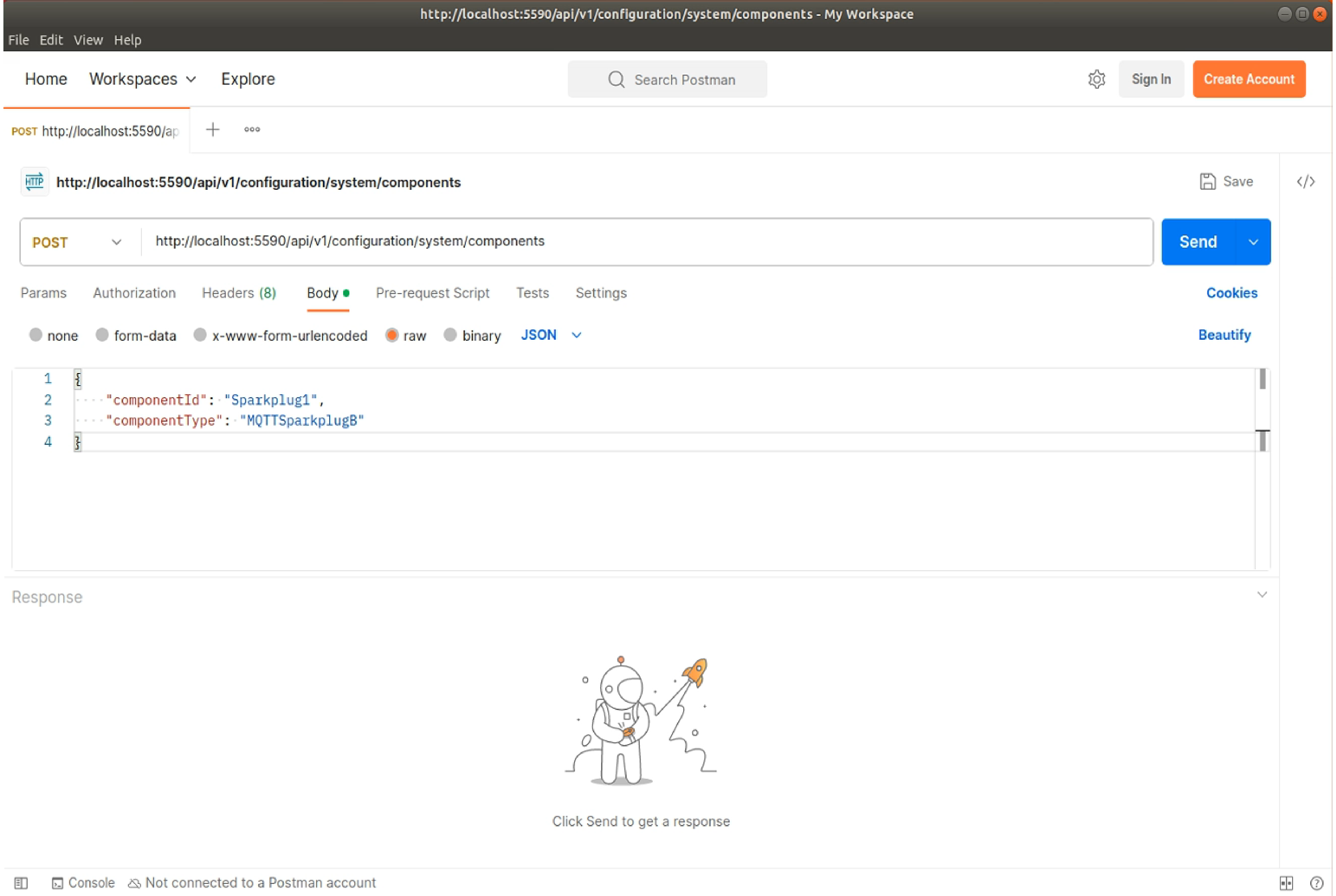
Open the browser, go to http://localhost:**<EDSPort>**/api/v1/tenants/default/namespaces/default/streams/ for all the streams available

Replacing the <StreamId> with a tag name to see data:

http://localhost:**<EDSPort>**/api/v1/tenants/default/namespaces/default/streams/**<StreamID>**/Data/Last

- Can use Grafana, 3rd party tool to visualize the data locally before egress
- Can egress the data to AVEVA PI Server or AVEVA Data Hub to use with their respective suite of software (AVEVA™ PI Vision™ for AVEVA PI Server and trend tool for AVEVA Data Hub)

Configuring the AVEVA Adapter using Postman


http://localhost:5590/api/v1/configuration/system/components - My Workspace
File Edit View Help
Home
Workspaces
Explore
Search Postman
Sign In
Create Account
POST http://localhost:5590/ap
Save

http://localhost:5590/api/v1/configuration/system/components

POST http://localhost:5590/api/v1/configuration/system/components

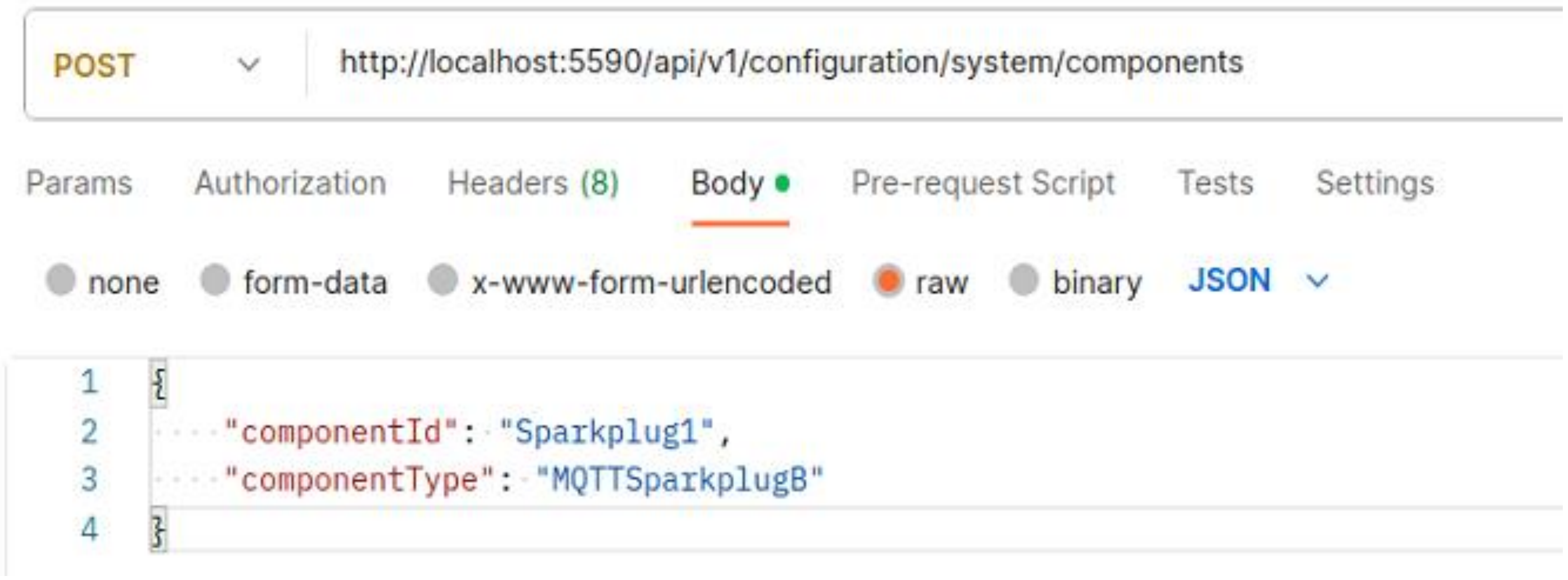
none form-data x-www-form-urlencoded [✓ raw] binary JSON

```
{
    "componentId": "Sparkplug1",
    "componentType": "MQTTSparkplugB"
}
```

Response
Click Send to get a response
Console
Not connected to a Postman account

Configuring the AVEVA Adapter

Create an adapter component – Postman

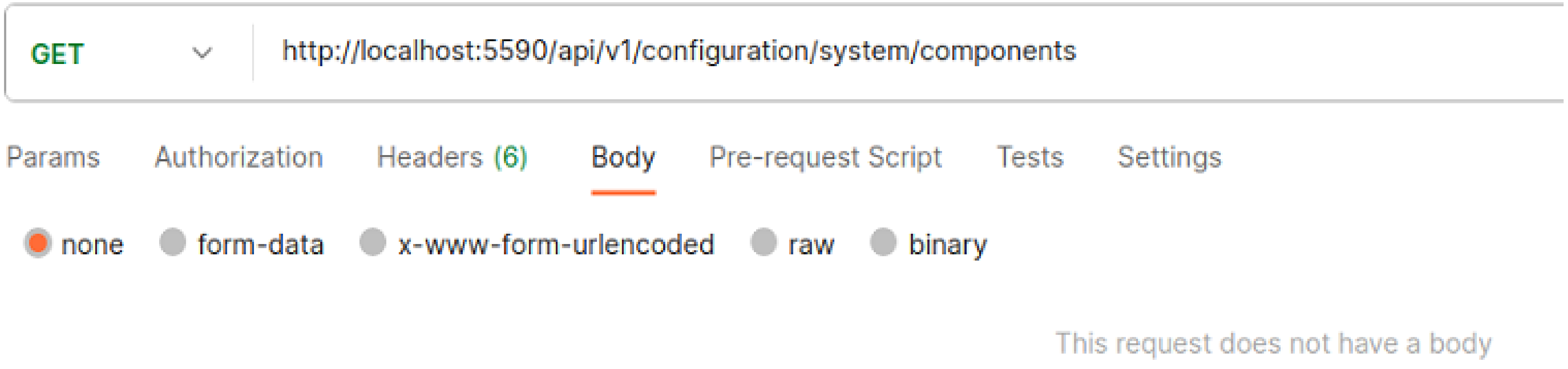


POST http://localhost:5590/api/v1/configuration/system/components

```
{
    "componentId": "Sparkplug1",
    "componentType": "MQTTSparkplugB"
}
```

Configuring the AVEVA Adapter

Create an adapter component – Postman



GET http://localhost:5590/api/v1/configuration/system/components

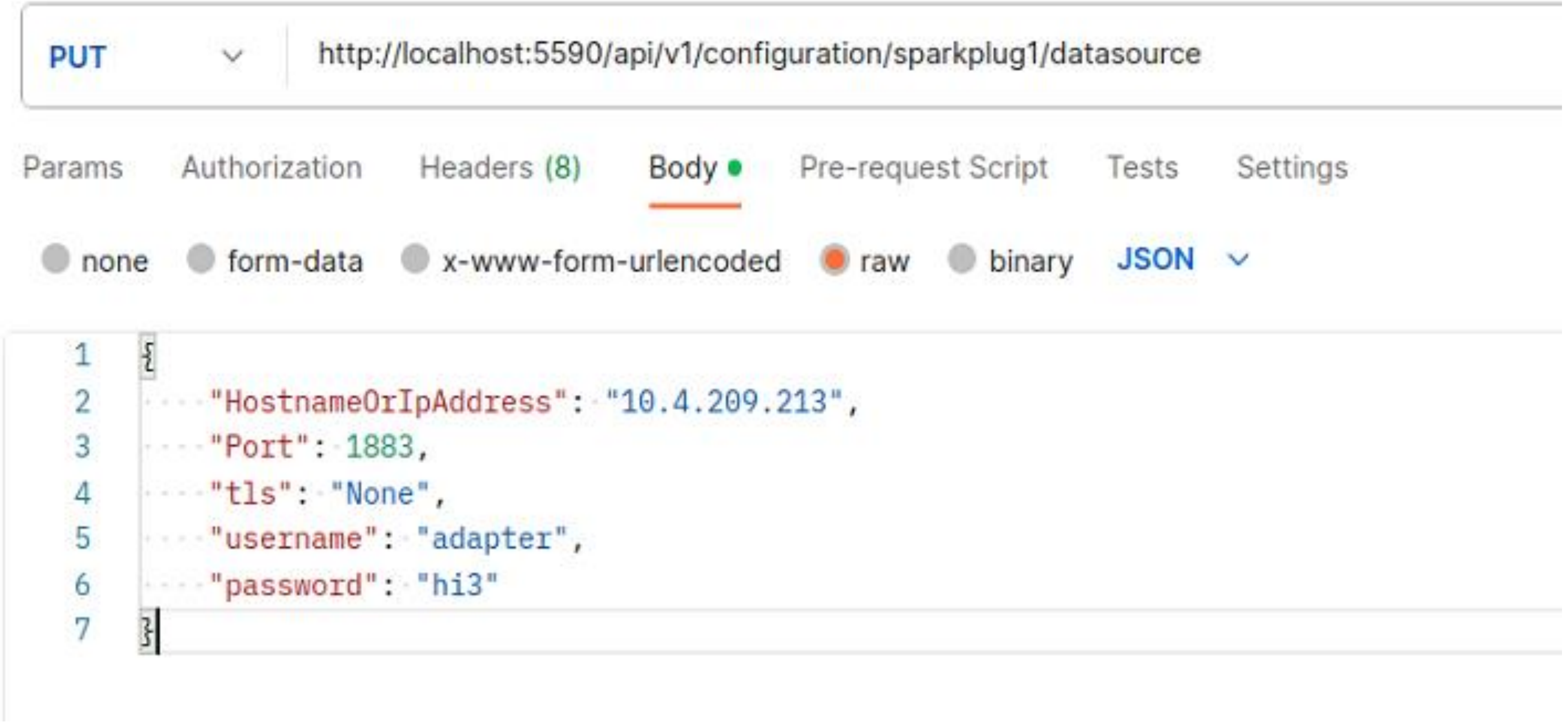
Params | Authorization | Headers (6) | Body | Pre-request Script | Tests | Settings

[✓ none] form-data x-www-form-urlencoded raw binary

This request does not have a body

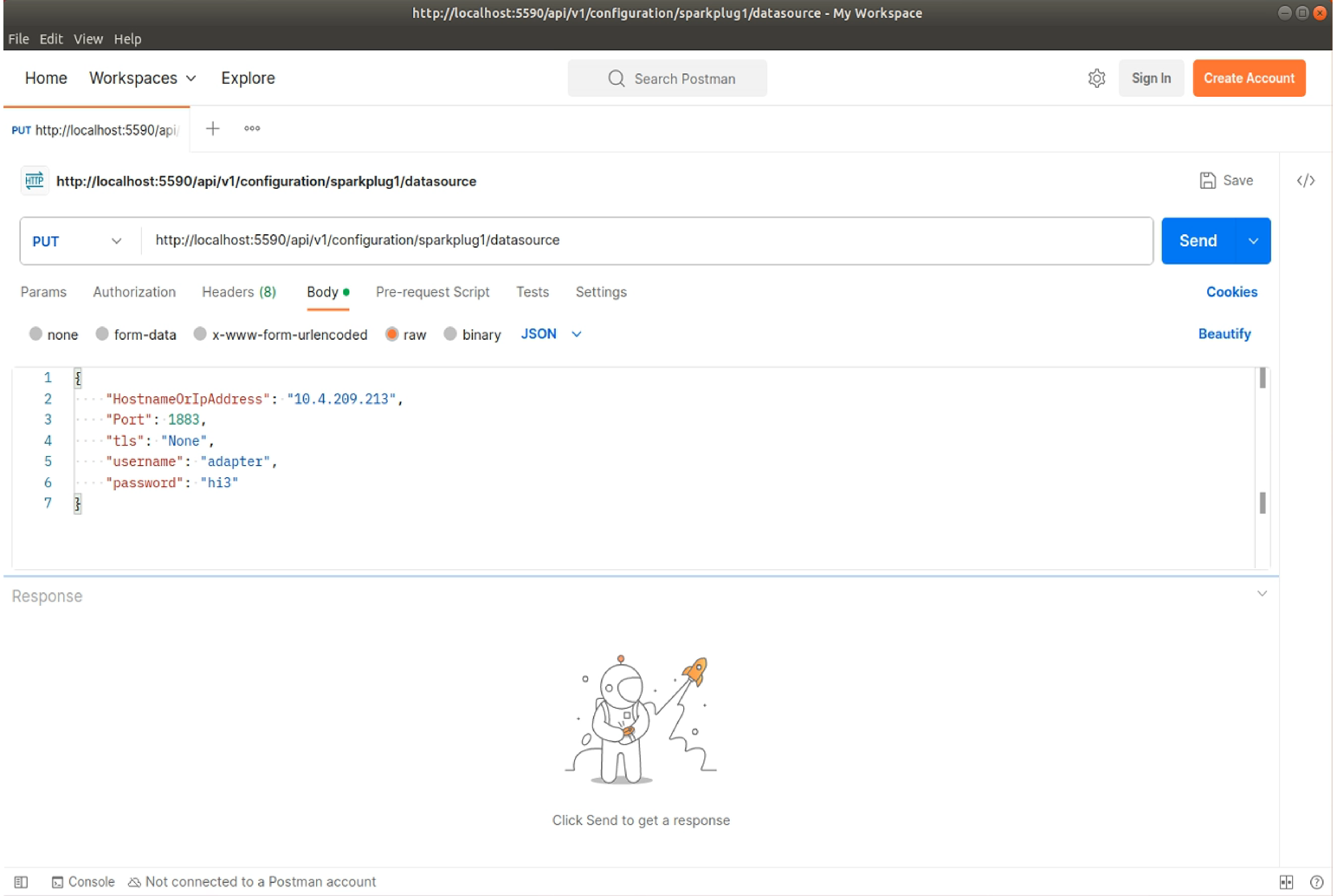
Configuring the AVEVA Adapter

Configure a data source – Postman



PUT http://localhost:5590/api/v1/configuration/sparkplug1/datasource

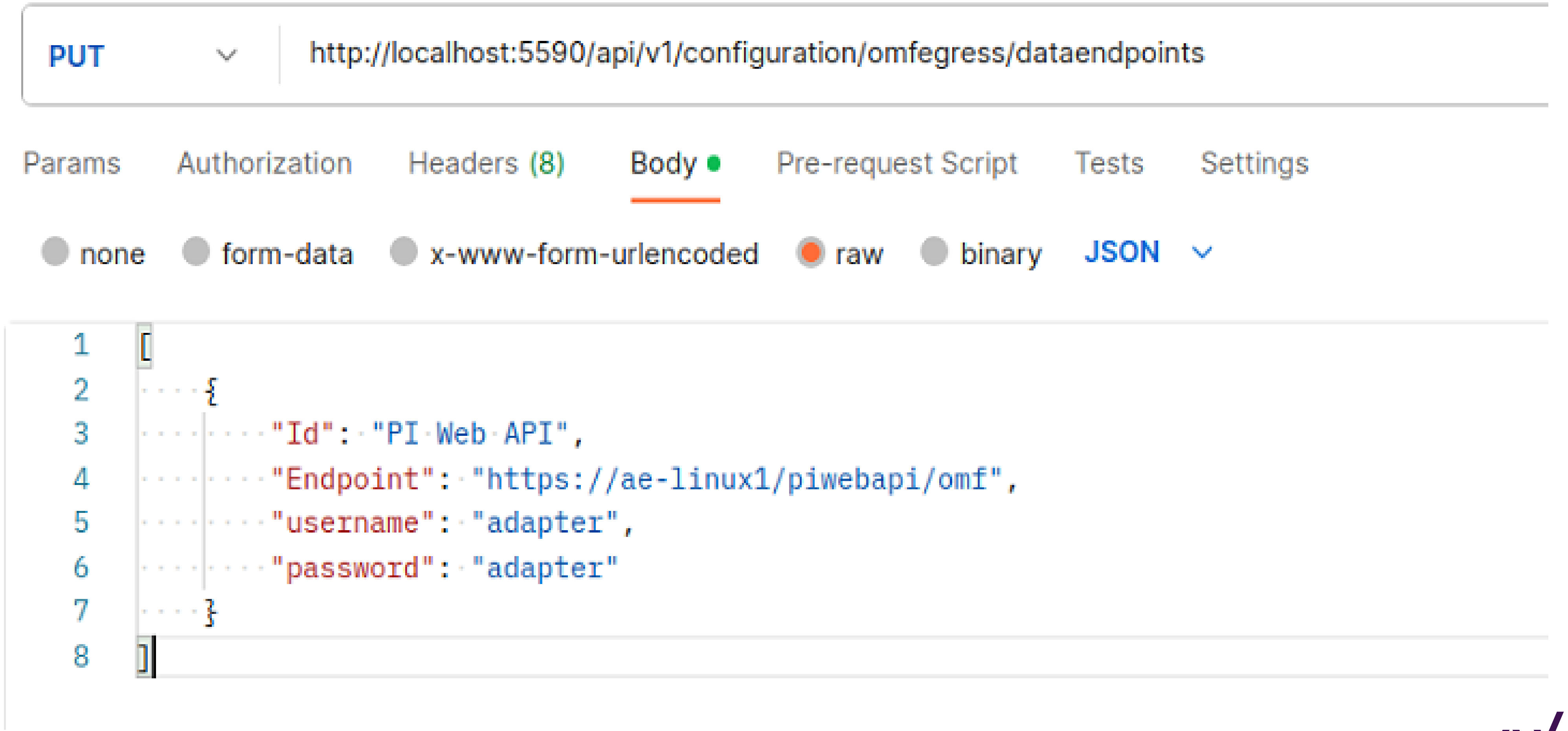
```
{
    "HostnameOrIpAddress": "10.4.209.213",
    "Port": 1883,
    "tls": "None",
    "username": "adapter",
    "password": "hi3"
}
```


http://localhost:5590/api/v1/configuration/sparkplug1/datasource - My Workspace
File Edit View Help
Home
Workspaces
Explore
Search Postman
Sign In
Create Account
PUT http://localhost:5590/api/
http://localhost:5590/api/v1/configuration/sparkplug1/datasource
Save
PUT
http://localhost:5590/api/v1/configuration/sparkplug1/datasource
Send
Params
Authorization
Headers (8)
Body
Pre-request Script
Tests
Settings
Cookies
none
form-data
x-www-form-urlencoded
raw
binary
JSON
Beautify
Response
Click Send to get a response
Console
Not connected to a Postman account

```
{
    "HostnameOrIpAddress": "10.4.209.213",
    "Port": 1883,
    "tls": "None",
    "username": "adapter",
    "password": "hi3"
}
```

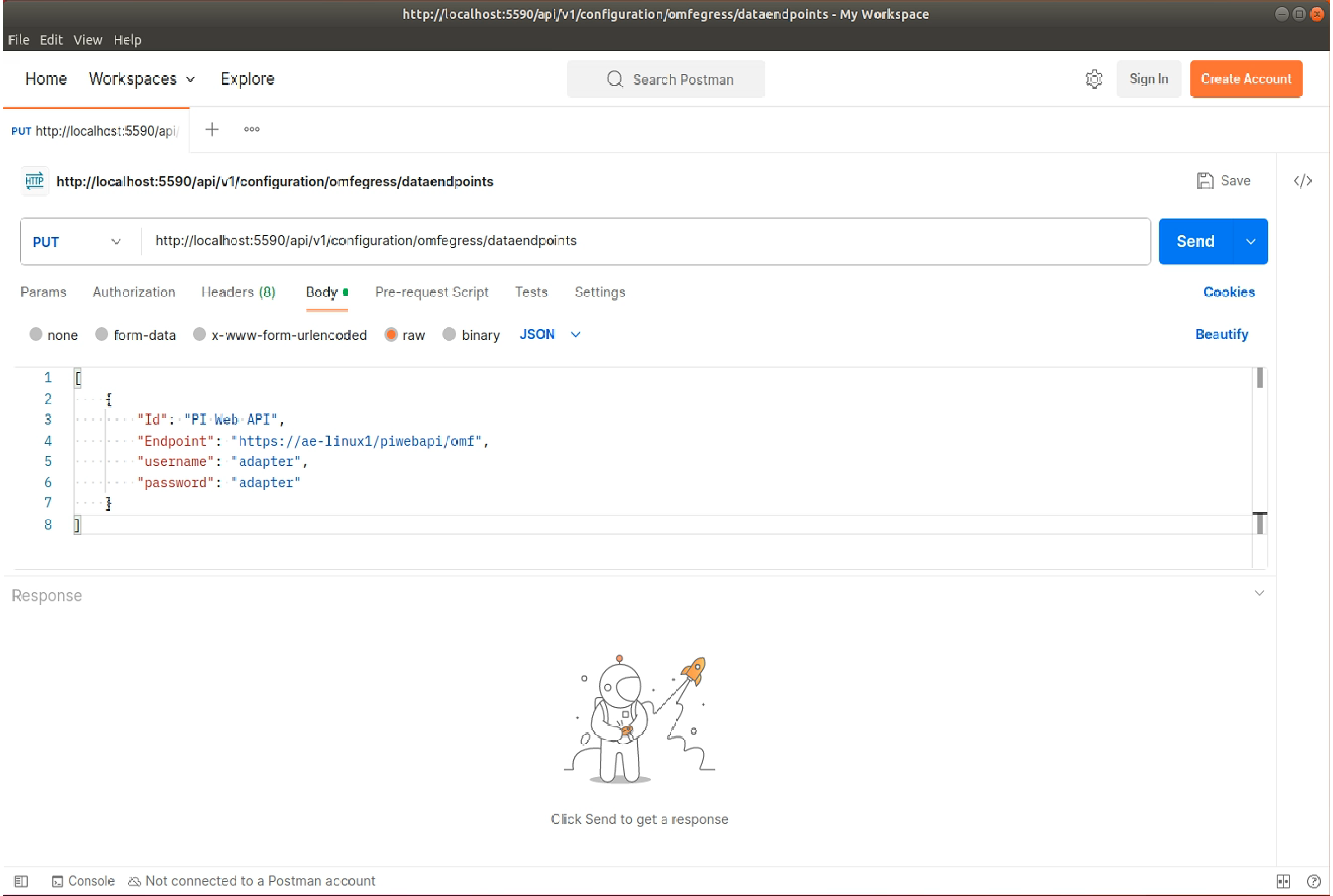
Configuring the AVEVA Adapter

Configure a data endpoint – Postman



```
PUT http://localhost:5590/api/v1/configuration/omfegress/dataendpoints
```

```
[
    {
        "Id": "PI Web API",
        "Endpoint": "https://ae-linux1/piwebapi/omf",
        "username": "adapter",
        "password": "adapter"
    }
]
```


http://localhost:5590/api/v1/configuration/omfegress/dataendpoints - My Workspace
File Edit View Help
Home Workspaces Explore
Search Postman
Sign In
Create Account
PUT http://localhost:5590/api/
Save
Params Authorization Headers (8) Body Pre-request Script Tests Settings
Cookies
Beautify
Send
Response
Click Send to get a response
Console
Not connected to a Postman account

http://localhost:5590/api/v1/configuration/omfegress/dataendpoints

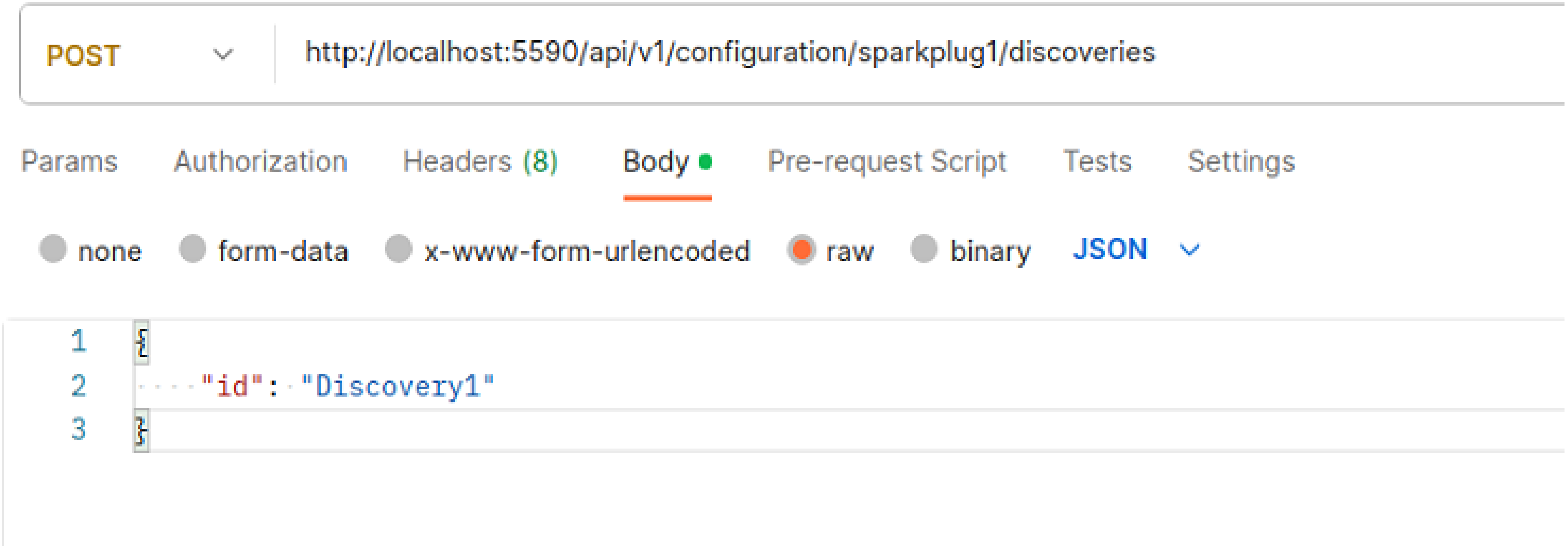
PUT http://localhost:5590/api/v1/configuration/omfegress/dataendpoints

Body: none form-data x-www-form-urlencoded [✓ raw] binary JSON

```
[
    {
        "Id": "PI Web API",
        "Endpoint": "https://ae-linux1/piwebapi/omf",
        "username": "adapter",
        "password": "adapter"
    }
]
```

Configuring the AVEVA Adapter

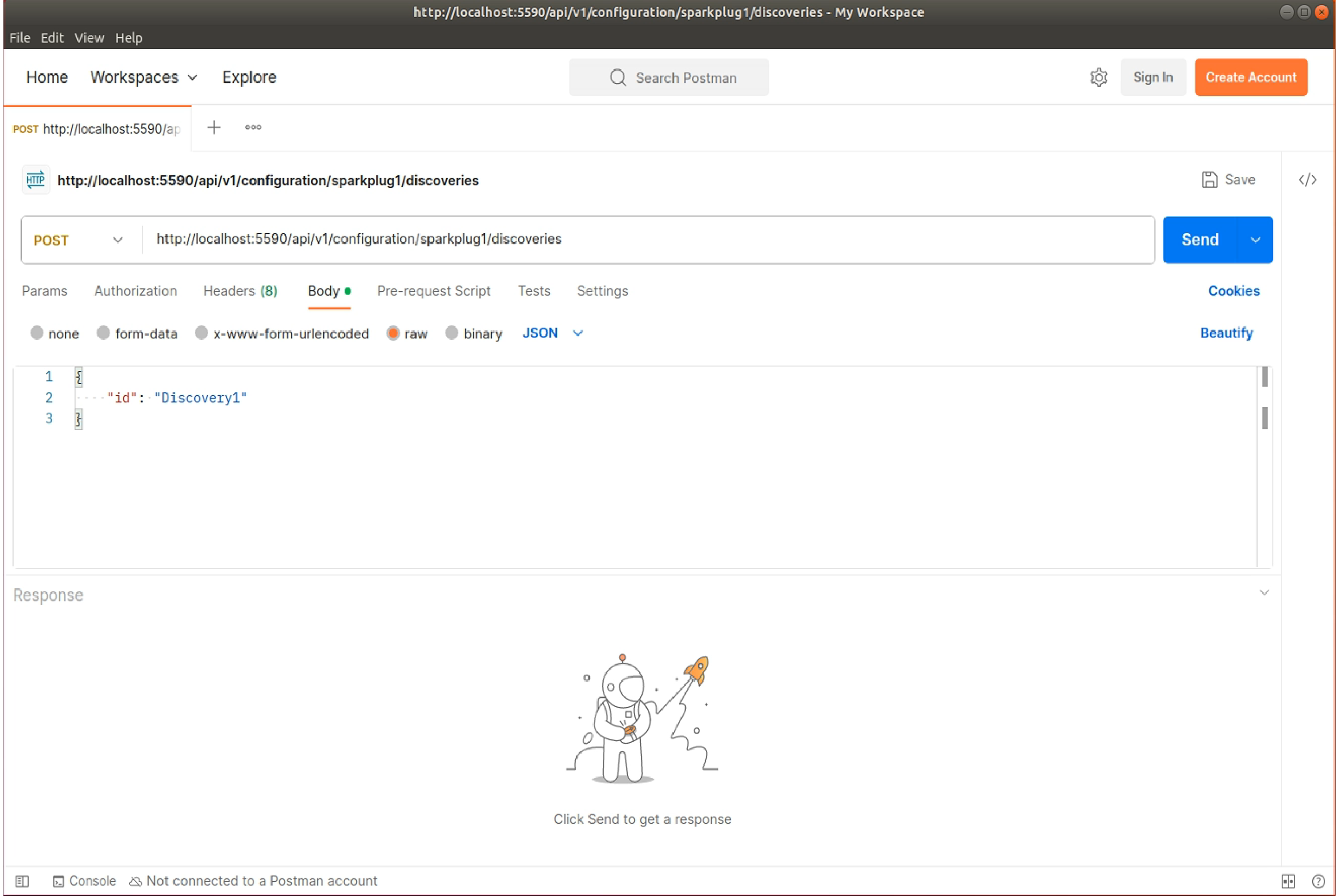
(Optional) Discover data items – Postman



POST http://localhost:5590/api/v1/configuration/sparkplug1/discoveries

none form-data x-www-form-urlencoded [✓ raw] binary JSON

```
{
    "id": "Discovery1"
}
```



http://localhost:5590/api/v1/configuration/sparkplug1/discoveries - My Workspace

POST http://localhost:5590/api/v1/configuration/sparkplug1/discoveries

Body: none form-data x-www-form-urlencoded [✓ raw] binary JSON

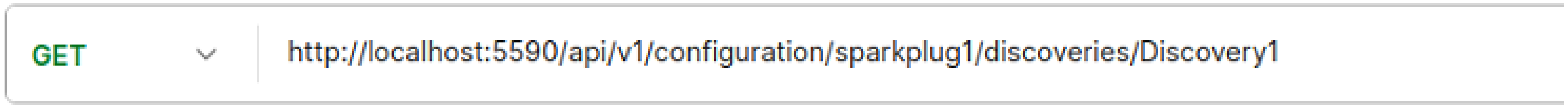
```
{
    "id": "Discovery1"
}
```

Click Send to get a response

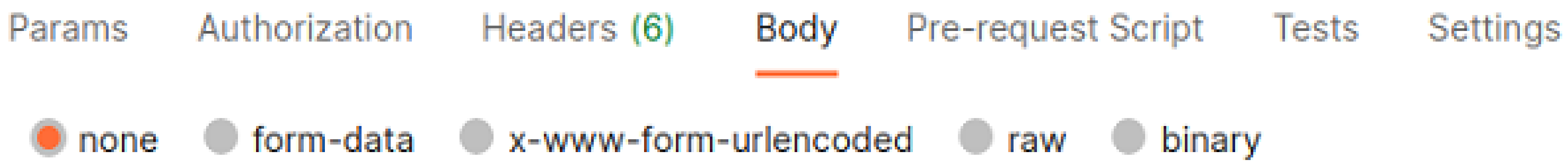
Configuring the AVEVA Adapter

(Optional) Check discovered data items – Postman

1. Get Discovery1 status



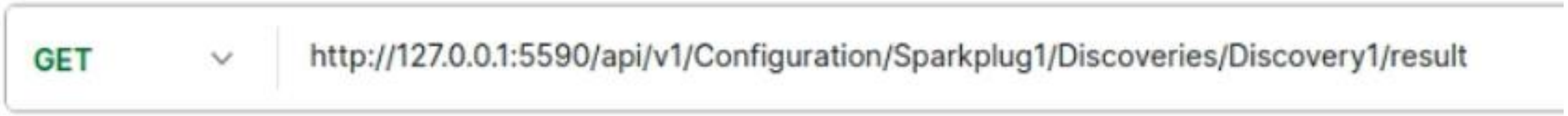
GET http://localhost:5590/api/v1/configuration/sparkplug1/discoveries/Discovery1



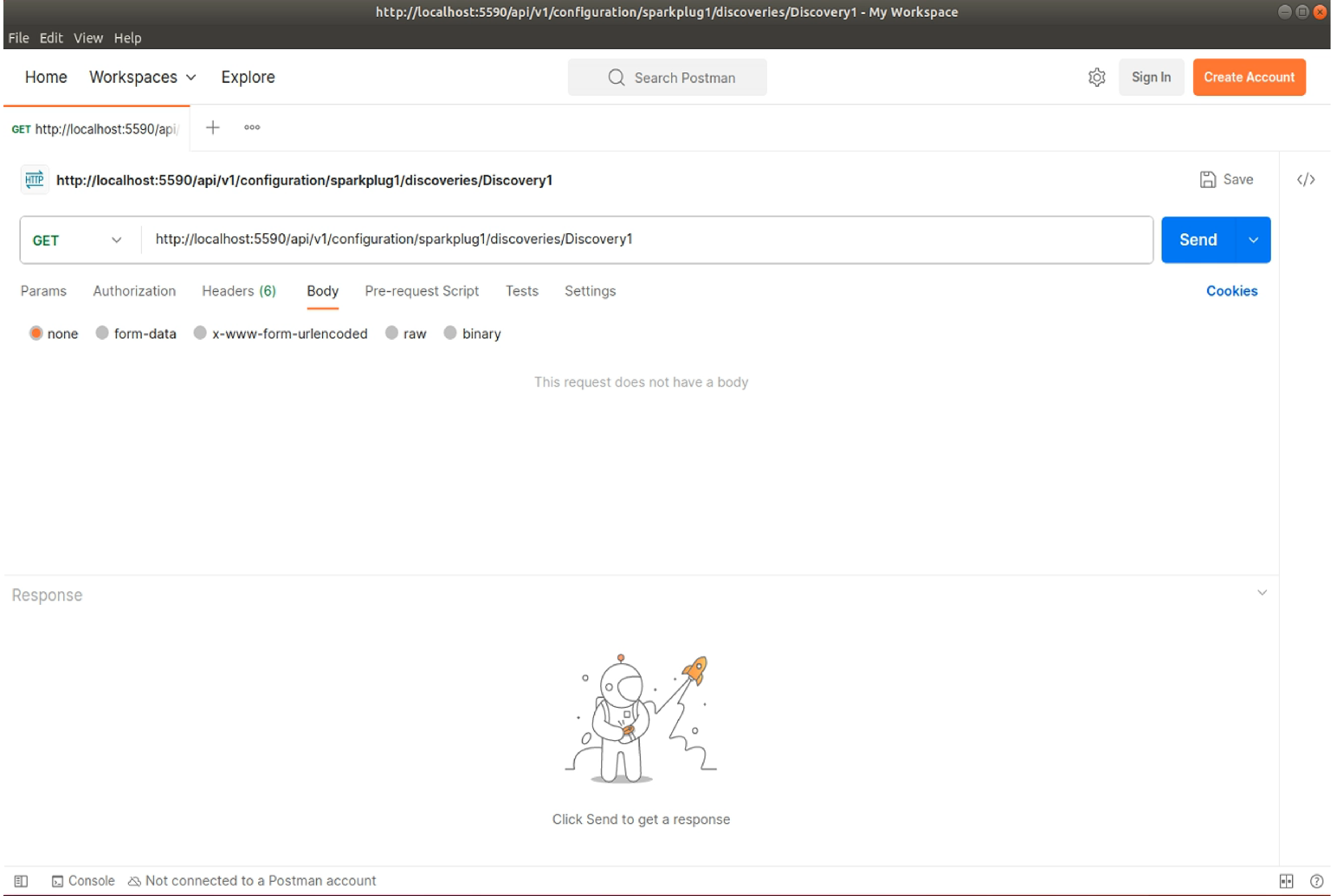
Params Authorization Headers (6) Body Pre-request Script Tests Settings

[✓ none] form-data x-www-form-urlencoded raw binary

2. Get Discovery1 contents



GET http://127.0.0.1:5590/api/v1/Configuration/Sparkplug1/Discoveries/Discovery1/result


http://localhost:5590/api/v1/configuration/sparkplug1/discoveries/Discovery1 - My Workspace

File Edit View Help
Home Workspaces Explore
Search Postman
Sign In
Create Account
GET http://localhost:5590/api/
Save
Send
Params Authorization Headers (6) Body Pre-request Script Tests Settings
Cookies
Response
Console
Not connected to a Postman account

http://localhost:5590/api/v1/configuration/sparkplug1/discoveries/Discovery1

GET http://localhost:5590/api/v1/configuration/sparkplug1/discoveries/Discovery1

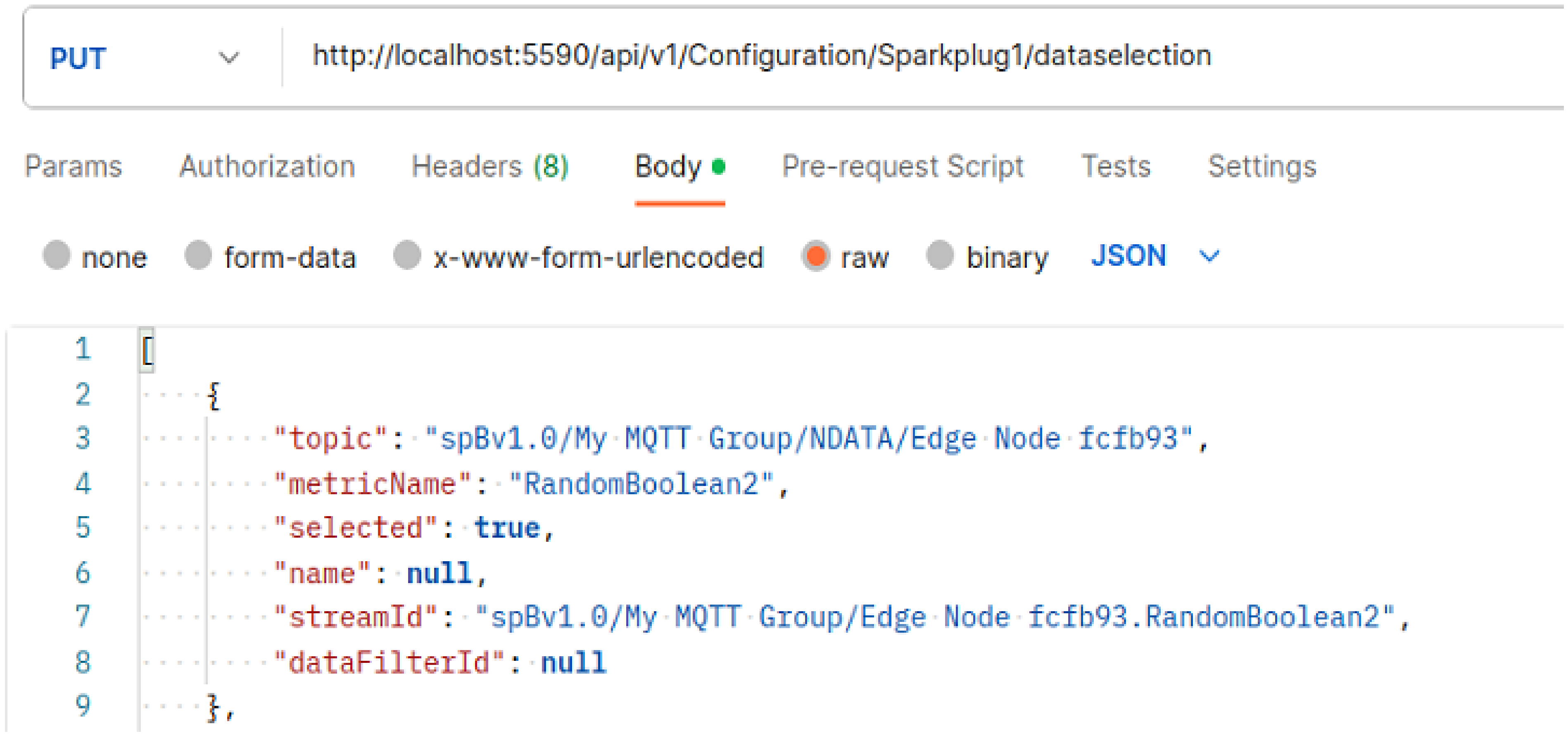
Body: [✓ none] form-data x-www-form-urlencoded raw binary

This request does not have a body

Click Send to get a response

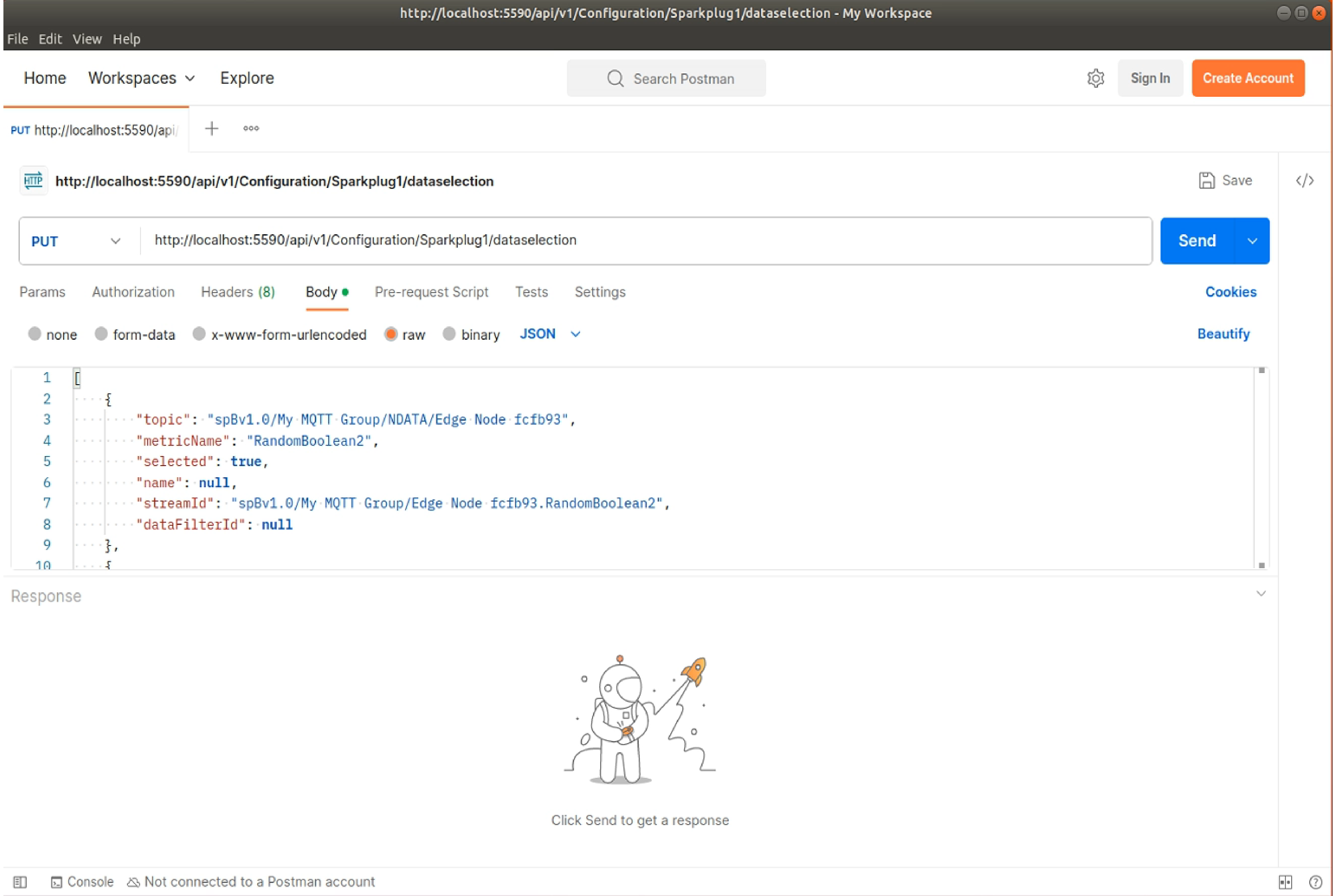
Configuring the AVEVA Adapter

Configure data selection – Postman



```
http://localhost:5590/api/v1/Configuration/Sparkplug1/dataselection
```

```
[
    {
        "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
        "metricName": "RandomBoolean2",
        "selected": true,
        "name": null,
        "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomBoolean2",
        "dataFilterId": null
    },
```



http://localhost:5590/api/v1/Configuration/Sparkplug1/dataselection - My Workspace
File Edit View Help
Home Workspaces Explore
Search Postman
Sign In
Create Account
PUT http://localhost:5590/api/
http://localhost:5590/api/v1/Configuration/Sparkplug1/dataselection
Save
PUT
Send
Params Authorization Headers (8) Body Pre-request Script Tests Settings
Cookies
none form-data x-www-form-urlencoded raw binary JSON
Beautify
Response
Click Send to get a response
Console
Not connected to a Postman account

PUT http://localhost:5590/api/v1/Configuration/Sparkplug1/dataselection

```
[
    {
        "topic": "spBv1.0/My MQTT Group/NDATA/Edge Node fcfb93",
        "metricName": "RandomBoolean2",
        "selected": true,
        "name": null,
        "streamId": "spBv1.0/My MQTT Group/Edge Node fcfb93.RandomBoolean2",
        "dataFilterId": null
    },
    {
```

Recap

- Learned how to install and configure AVEVA Adapter for MQTT and AVEVA Edge Data Store on a Linux environment
  1. Using edgecmd
  2. Using Postman
- Very easy to configure and implement
- Script-ability + access to deploy on many environments

About us

Ashish Jain

Senior Tech Support Engineer

Escalation team for AVEVA PI Interfaces, Connectors, and Adapters

Evan Greavu

Senior Tech Support Engineer

Escalation team for AVEVA PI Interfaces, Connectors, and Adapters

Questions?

Please wait for the microphone.

State your name and company.

Please remember to...

Navigate to this session in the mobile app to complete the survey.

Thank you!

AVEVA

AVEVA

linkedin.com/company/aveva

@avevagroup

AVEVA